Head On™ 2

INVINCO

MANUFACTURED BY

Gremlin®/SEGA®

MANUAL PART NO. 420-0359

OWNER'S MANUAL

HEAD ON 2

&

INVINCO

DUAL GAME MANUAL

HEAD ON2/INVINCO OWNER'S MANUAL

INTRODUCTION

This is an electronic game that makes extensive use of digital integrated circuitry and television monitor circuitry. This manual assumes the maintenance technician possesses a general knowledge of solid state circuitry, microprocessor, TTL digital integrated circuitry and T.V. monitor concepts. Any individual NOT knowledgeable in these areas SHOULD NOT attempt repair of the electronic portion of this game. IT SHOULD BE NOTED THAT ANY ATTEMPT TO REPAIR THE GAME IN THE FIELD WITHOUT EXPRESS CONSENT OF THE FACTORY WILL IMMEDIATELY VOID THE WARRANTY!!!

IMPORTANT NOTES:

NEVER replace any components with anything other than exact replacement parts. (See Parts List located on Service Schematics.

NEVER remove circuit boards/connections while power is on.

DO NOT replace the fuse with anything other than the proper value. A blown fuse indicates an overload condition within the game. Replacing the fuse with a higher value can cause severe damage to internal components if an overload occurs.

ALWAYS consult the manual before attempting repairs.

CORRESPONDENCE regarding this game should be addressed to:

GREMLIN INDUSTRIES, INC.

8401 Aero Drive

San Diego, California 92123

(714) 277-8700

IMPORTANT NOTE

An important service note is posted in this game and is repeated here for emphasis:

> IF AT ANY TIME THE T. V. SCREEN SHOWS A MEANINGLESS DISPLAY OR THE GAME OTHERWISE MALFUNCTIONS, SIMPLY DROP A COIN INTO THE COIN MECHANISM. THIS SHOULD CORRECT THE PROBLEM. IF NOT, THE GAME REQUIRES SERVICE.

The circuitry in this game has been arranged so that the insertion of a quarter through the coin mechanism will reset the system.
This clears up temporary problems caused by power line disturbances, static, etc.

SERVICE TECHNICIAN NOTE:

The system reset circuitry described above requires that the coin counter is attached to the system. If there is a coin counter problem and no replacement is available, the game will function properly if a 10K Ohm resistor is connected across the coin counter input pins to the video logic board.

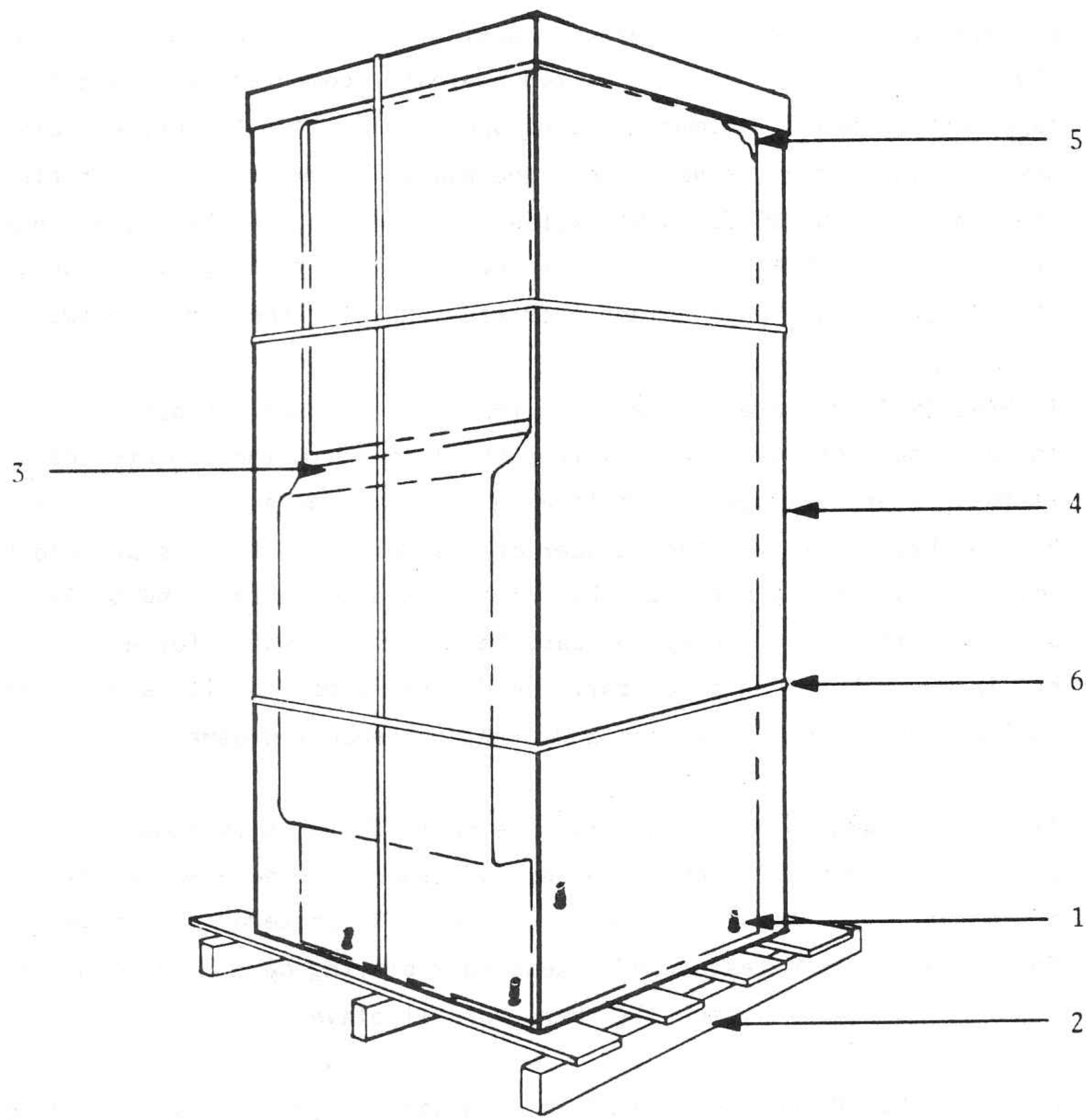
REPACKAGING INSTRUCTIONS

Should it be necessary to ship this game, follow the instructions below for game recrating:

A) If the original shipping bolts have been discarded (Ref.1), obtain four 5/16-18x1 3/4" hex head bolts with 5/16" flat washers. Carefully lay the game on its side and attach skid (Ref.2).

B) Place game upright. Tape game keys to upper flange of operator's panel (Ref.3). Crate the game using appropriate shock-absorbent packing material (Ref.4). Include padding on all four corners of the game (Ref.5). After crating is completed, secure package with strapping (Ref.6).

NOTE: If the game is to be shipped to GREMLIN for service or repair, attach a tag identifying the distributor and indicate the service or repair to be made; include the full serial number of the game. GAME MUST BE SHIPPED PREPAID.



HEAD ON 2-GAME CONCEPT

The most noticeable change on Gremlin's new HEAD ON 2 game, is the addition of two turn-around lanes on either side of the screen. With these turn-around lanes, HEAD ON 2 becomes a different game, even more challenging and exciting.

The game begins by displaying the following information on the screen:

BONUS
200

POINTS PER ...= 5
POINTS PER ◊◊ = 10

The computer's car and the player's car start at the bottom of the screen. When the player clears all lane markers against one computer car, he is awarded the 200 BONUS points and then is pitted against 2 computer cars. After clearing the lane markers again, 3 computer cars appear. Finally, 4 computer cars are the maximum amount that drive against the player. Each time a player clears all lane markers, the BONUS POINTS value is increased, so that more bonus points are awarded for beating 2 computer cars than for beating 1. In addition, the POINTS PER dot/diamonds values increase each time the bonus is awarded.

In HEAD ON 2, the player now has a few more lane options open to him in order to gain the most points and avoid a collision with the computer car. For example, if the player reverses his car's direction by passing through a turn-around lane, he then becomes either the pursuer or the pursued. If he is pursued by the computer car, the player must be careful to avoid a rear-end collision. If the player is following a computer car, he must again watch for a possible rear-end collision into the computer car. The different possibilities are what makes HEAD ON 2 an even more challenging and strategy-demanding game.

Also, each game is different from the next. While it is tempting to find a winning pattern, the game will not necessarily respond the same way every time. Because of the varied combination of action, a working pattern for one game may not work for the next. This feature will keep them playing game after game; and, each time, new video excitement is there for all players.

Refer to the OPTIONS section of this manual for instructions on changing the number of player cars.

INVINCO GAME CONCEPT

INVINCO is a fast-paced Gremlin Multi-Phase game that pits the player against a attacking force of numerous enemy warriors.

The player begins with three Prime Defenders which are released one at a time behind the defense barrirer. The enemy warriors immediately begin to advance, firing missiles as they approach. In order to destroy them the player must blast away the barrier in strategic places, exposing the columns of warriors to his own missiles. The player then proceeds to destroy as many warriors as possible while dodging their attacking missiles. The warriors in the back rows are worth more points and each warrior in the very last row must be hit three times (becoming smaller after each hit) before it is finally destroyed. If the player aims carefully enough, he may hit one warrior behind another. This will cause that warrior to explode, taking nearby warriors with it. For an even higher score the player may try to hit the large bonus targets which sweep intermittantly across the backfield.

If during this time the player's Prime Defender is hit by enemy fire, it will explode and another will take its place. This continues until all three Prime Defenders are destroyed and the game ends. If the Prime Defenders are not destroyed and the player clears the entire field of enemy warriors, INVINCO will send out the "Avenging Spirit," a large target which manuevers wildly as it fires its missiles in a last ditch effort to destroy the Prime Defender. If the player clears the field a second time, two Avenging Spirits will descend; after the third clearing the player will face three. Thus the difficulty is intensified as the player's skill increases.

OPTIONS SELECTION INSTRUCTIONS:

Your HO2/INVINCO game is adjustable for different numbers of player cars and player firing bases. The following chart shows how to change these: (Locate the 6-position DIP switch on the logic board. This switch selects the desired number)

HEAD ON 2

#of cars desired	position on DIP switch
2	switches 1 and 2 up
3	switch 1 up
4	switches 1 and 2 down

INVINCO

# of firing bases	position of DIP switch
3	switch 4 up
4	switch 3 up

SPECIAL NOTE: NEW GAME BOARDS AND NEW EPROMS

The following chart shows the two kinds of logic boards Gremlin will use in future games. These will be either a SINGLE VIC board or a DUAL VIC board. Also shown are the possible combinations of Eprom types that Gremlin will be using. The 2 Eprom types are

1) 2708 (holds 8K of memory)
2) 2716 (holds 16K of memory)

Obviously, the 2716 holds twice as much information as the 2708, BUT the 2 Eproms are NOT directly compatible-- in other words, you have to replace a 2716 with another 2716, and a 2708 with another 2708. In addition, the 2716 Eprom socket is modified slightly to accept the 2716 Eprom. If it is ever necessary to replace a new Eprom, be sure to specify "2708" or "2716". These numbers are printed on the Eprom package.

Logic Board Type:	Possible Eprom Types Used:	Where Used:
SINGLE VIC board (see Figure 1)*	1) all 2708's	HEAD ON 1 HEAD ON 2 Future games
	2) 2708's and 1 2716 (used in combination)	INVINCO DEEP SCAN Future games
DUAL VIC board (see Figure 2)*	1) all 2708's	Any dual game Future games

The reason for using both types is that some game programs are larger than could be contained in a set of 2708's. So, usually one 2716 provides enough additional memory space to hold a longer program.

* Figures 1 and 2 show each of the two types of Gremlin logic boards. The boards in the photos are labelled for easy identification of all external connections.

SPECIAL NOTE: POWER SUPPLY MODIFICATIONS: For DUAL VIC Logic Boards ONLY

In order to supply -5 volts to the DUAL VIC logic board, it was necessary to modify the game power supply. The modification simply adds a 7905 -5 volt regulator (Gremlin part #313-0023) to the power supply chassis; the 7905 is connected into the -12 volt line at pin 11 of the power supply output connector. PIN 17 OF THIS CONNECTOR NOW BECOMES THE -5 VOLT OUTPUT. The other pins remain the same:

pin 11= -12v
pin 12= +12v
pin 13= 2-3 V AC signal
pins 14,15,16 = GROUND
pin 17= -5v
pins 18,19,20= +5v

Also, a 8900 ufd filter capacitor has been added to the power supply to provide better +12 volt regulation.

TRANSFORMER VOLTAGE CONVERSION INSTRUCTIONS:

To convert the game transformer to 100, 115, or 230 VAC, refer to the following chart:

*For 100 volts: Connect the voltage INPUT lines to transformer terminals 1 and 2.

*For 115 volts: Connect the voltage INPUT lines to transformer terminals 1 and 3.

*For 230 volts: Connect the voltage INPUT lines to transformer terminals 1 and 4. The fluorescent lamp line must be connected to transformer terminal 3.

ALSO, THE TV MONITOR MUST BE CONVERTED TO THE SAME VOLTAGE INPUT AS THE GAME TRANSFORMER. REFER TO THE MONITOR MANUAL IN THE GAME.

MAINTENANCE PROCEDURES

I. Power Supply (Refer to drawing #815-0020, sheet 4)

1. Remove output connectors from power supply.
2. Make these initial tests: (GND to BLACK lead on C18, 9000 ufd capacitor)
   - a. +9 VDC on POSITIVE terminal of C18
   - b. +17-19 V on C6 (4700 ufd cap.)
   - c. -17-19 V on C5 (4700 ufd cap.)
   - d. -12 V at output pin 11 (adjustable by trim pot R42)
   - e. +12 V at output pin 12 (adjustable by trim pot R8)
   - f. +5 V at output pins 18,19,20 (adjustable by trim pot R9)
   - g. GND (ground, 0 V) at pins 14,15,16
   - h. 2-3 V AC at pin 13 (Don't forget to change meter scale to AC)
   - i. -5 V at pin 17
3. Check these voltages again with the logic board connected. If any are wrong, a loading condition exists in the logic board, most likely.

II. Logic Board

The following instructions will help you trace down and find most problems associated with the logic board. The procedures are listed by the more common kinds of problems that could arise. Read through all the steps first, then apply them one at a time. The necessary equipment are an oscilloscope and AC/DC voltmeter.

1. NO PICTURE: TV TUBE AND FLUORESCENT LAMP ARE OFF
   - a. Plug the game in and check to see that it is receiving 115 (230) VAC. Measure 115 VAC at the input terminals of the game transformer. If it is not present here, proceed to next step.
   - b. Check the fuse; if it is good, proceed to next step.
   - c. Remove the cover of the junction box in back of the game. Measure 115 VAC on the output of the line filter. If it is not present, the line filter may be bad. Or, one of the AC line connections in the junction box may be loose. UNPLUG the game and re-check these connections.
   - d. If the fluorescent lamp still does not operate, turn off game and on again. This usually re-starts the lamp. If it doesn't, turn the lamp in its socket; this will re-seat it for a better connection. Sometimes the lamp works loose during shipment.
   - e. An ON/OFF switch for the TV monitor is located on the TV chassis, below the neck of the picture tube. Make sure it is ON.
2. NO PICTURE: TV TUBE AND FLUORESCENT LAMP ARE ON. SCREEN BLACK.
   - a. First, make a quick check of the monitor-to-logic board connections: Are all wires making contact with the pin connector? Are the wires secure on the monitor plug-in connector?

b. Check to be sure U14 is seated in its socket properly, and that no pins are bent. This IC is a Prom that develops the necessary video timing sequences. Usually if one pin on the chip is out of the circuit, the screen will appear black. Proceed to next step if this chip is seated correctly.

c. Inspect the high-voltage lead coming off the monitor's high-voltage transformer. This lead attaches directly to the TV tube. Sometimes, during shipment, this wire is jostled out of contact with the transformer. Turn off the game, and carefully push the wire down, toward the transformer, to re-seat it. Now check to see if the picture comes on. If it doesn't, proceed to step d.

d. Using a voltmeter, measure the three voltages powering the logic board. These voltages, +5,-5, +12 volts can easily be measured at the power supply-to-logic board connection. If all the voltages are present, go to next step.

e. Using an oscilloscope, test for clock signals at the following points: (For the moment, don't worry about what each signal should look like: We're concerned with finding floating signals, and/or signals that are not present when they should be, and why they are not.)The scope setting is .2v/div. @ 5usec., with a 10:1 probe. All clock signals, except the video signal, are about 5 volts in amplitude.

* Check pin 6 of U50. Look for a 1½-2 volt video signal. If not there, check pin 4 of U50. If it is here, U50 is probably bad.
* If the signal is not at pin 4 of U50, suspect U57 and U67.
* Check the following IC's and pins for any floating or missing signals: U13, pin 8. U22, pin 9. U15, pins 11,12,13,14. U14, pins 1-7, 9. U19, pins 2,6,10,15. U20, pins 2,7,10,14,15. These chips make up the video timing circuit. Make sure there are no floating or missing signals on any of these chips. If there are, suspect the chip is bad.

3. PICTURE APPEARS: COLOR IS DISTORTED; SOME COLORS MISSING

a. Check the red, blue, and green output signals on U67, pins 4,7,9, respectively. If no signals present, suspect U67, U49, or U66.

4. INCOMPLETE PICTURE: RANDOM DISPLAY

a. Sometimes the game appears on the screen with parts of the picture showing incorrect information. For example, the "HI SCORE" listings display jumbled information, while the rest of the picture is normal. The most likely cause of this problem is one of the 8 Ram IC's U69 through U76. The quickest way to find the bad Ram is simply to replace each IC, one at a time, with knowngood Rams. Be sure not to bend any pins when replacing the IC's. Also, don't overlook the possibility that one of the Ram sockets is bad.

5. RANDOM DISPLAY WHEN GAME IS TURNED ON

a. Activate the coin switch a few times to see if this clears the picture. If not, turn the game off, then on again. If the jumbled display still appears, proceed to step b.

b. Check the reset circuit on the logic board. (Refer to the schematic)

When power is first applied to the game, a reset circuit consisting of Q1, Q2, U18 and U35 is triggered on to reset the microprocessor. This reset signal forces the microprocessor to start at the beginning of the game program. If the microprocessor is not reset, it will still operate—it just won't operate on the right program instructions or data, and will continually display a jumbled pattern on the screen. So, begin by checking for a 3-4 VAC signal at pin 3 of the power supply-to-logic board connector. Follow the signal through Q1, where, at the collector, a sawtooth wave appears. Then, when power is first applied, observe pin 2 of U18 as capacitor C10 slowly charges to about 3 volts. When this level is reached, U18 is triggered to change states, causing pin 3 to go high, then low. This change is inverted by U17 and finally reaches pin 26 of the Z80. Check pin 26 of the Z80 for a low-to-high signal change. If not present, one or more of the reset circuit components is bad. If it is present, proceed to step c.

c. The following lists some probable causes of the jumbled display pattern:

* one or more RAMs
* one of the Eproms, U1-8, U26-33
* The microprocessor, U 16, is bad.
* U47 (74LS245) is bad.
* U51 and U52 are bad.
* Check the 3 operating voltages, +5,-5, +12 VDC.

6. GAME DOES NOT COIN UP

a. A common problem with a game that does not coin up is that the coin switch trip wire is out of adjustment. Usually, all that is necessary is to bend the trip wire up or down, depending on whether a heavier or lighter tension is needed.

b. There may be a problem in the coin circuit on the logic board. Check U62, pins 6,8 for pulses each time the coin switch is tripped. Also, U43 and/or U62 may be bad. Suspect U45, also.

c. It is possible that one of the coin counter transistors, Q3 and Q4, is bad. Determine whether or not the counter advances each time the coin switch is tripped.

d. Don't overlook an incorrect or faulty coin switch-to-logic board connection; sometimes these wires work loose from the coin switches.

7. PLAYER CONTROLS NOT WORKING

a. Check first to be sure all control switch connections are secure. This includes checking the black wires, or ground leads.

b. If these connections are good, make sure the control panel leads are intact inside the Molex tm connector to the logic board.

c. If the controls still do not work, suspect U44 on the logic board. However, U44 could be good but might not be receiving the activating pulses from U24, pin 10 or U25, pin 12. Check these also.

8. GAME'S SOUNDS NOT HEARD

a. Check to be sure the sound board output leads are making good contact on the GAME SELECT SWITCH located on the control panel. Also, make sure the audio lead from this switch is connected to the power supply/amplifier board properly. (Refer to the game wiring schematic)

b. If these connections are good, check the power supply/amplifier board for any audio signals. Specifically, check U4, Q8,Q9 on the amplifier board for any game sounds.

c. If there are none here, suspect U63 and U64 on the logic board. Also, check U23 for the pulses that turn on U63 and U64.

d. If these chips appear good, the sound boards are probably bad. Refer to the sound board schematics for each sound's circuit.

The following chart lists the sound type and corresponding sound board pin numbers:

	Sound type	Sound board pin #
HEAD ON:		
	Crash	1
	High speed player car	2
	Car sound on	3
	High speed computer car	4
	Audio output	5
	Screech #1	6
	Screech #2	7
	Bonus	8
INVINCO:		
	Ship hit	2
	UFO hit	3
	Laser	4
	UFO 1	6
	Saucer	8
	UFO 2	7
	Audio out	22
DEEP SCAN:		
	Bonus sub.	1
	Sonar	3
	Score bonus	4
	Water spray	5
	Depth charge explosion	10
	Sub explosion	11
	Ship explosion	12
	Audio out	15

RECOMMENDED SPARE PARTS LIST- DUAL GAMES

Gremlin Part #:	Description:	Quantities per 10 games:
130-0001	speaker	1
130-0002	speaker cover	1
200-0011	Algol color monitor	1
253-0104	Plexi front monitor panel	1
253-0120	panel logo, HO2/INVINCO	1
253-0121	" " HO2/DEEP SCAN	1
253-0123	" " DEEP SCAN/INV	1
390-0011	fluorescent lamp	2
220-0008	coin counter	1
220-0035	coin door lock and key	2
220-0066	coin mechanism, complete	2
220-0071	coin reject button&spring	3
220-0072	coin return stop (U-bolt)	3
475-0007	volume control	1
510-0014	slide switch	1
510-0042	coin switch	3
510-0051	push button switch	1
(800-0076)	photo coin assy.	
270-0001	line filter, junction box	1
514-0001	fuse, 2A, slo	5
240-0007	black pushbutton control	3
510-0023	mounting/contacts for above	3
510-0050	game select switch	3
800-0056	complete joystick	2
240-0091	joystick knob	3
250-0289	threaded rod	3
250-0291	upper sleeve	3
510-0041	joystick switch	5
315-0019	2708 Eprom, blank specify by number on Eprom	1 set
315-0050	2716 Eprom specify by number on Eprom	1 set
316-0246	color prom INV/DS	1
316-0287	color prom HO2/INV	1

	color prom H02/DS	1
	color prom INVINCO	1
	color prom DEEP SCAN	1
314-0001	555 IC	5
314-0093	74LS374 IC	3
314-0099	74LS245	3
314-0104	74LS138	3
314-0105	74LS253	3
315-0031	Z80 microprocessor	2
315-0039	RAM IC	10
315-0042	Video Interface Chip (VIC)	3
316-0206	video timing prom	3
475-0002	resistor pack	3
482-0010	PE8050 transistor	3
482-0014	2N4401 "	10
510-0043	6-position DIP switch	2
(The following are suggested parts for all sound boards:)		
313-0008	LM348 IC	5
314-0042	7406 IC	5
315-0006	CMOS 4017 IC	5
315-0035	MM 5837 IC	5
315-0043	CMOS 4069 IC	5
481-0006	1N914 diode	10
481-0008	1N5231 Zener diode	10
482-0006	2N4403 transistor	10
482-0023	2N4093 "	10
313-0004	LM741 IC	5
315-0005	CMOS 4013 IC	5
315-0009	CMOS 4081 IC	5

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San Diego, California 92123

PARTS LIST

TITLE ASSY DUAL GAME V.I.C.

800-0058 DWG NO | SH 2 OF 8 | REV C

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
1	151-0005	1					CAP CER 680pf 50V	C12
2	151-0011	4					CAP CER .01µf 50V	C73, C74, C41, C42
3	151-0012	64					CAP CER .1µf 50V	C1,2,4,5,7,11,13-40,43-72
4	152-0001	1					CAP FILM .1µf 100V	C75
5	153-0001	3					CAP TANT 10µf 25V	C3, C6, C10
6	153-0002	1					CAP TANT 1µf 25V	C9
7	153-0008	1					CAP TANT 100µf 20V	C8
8	170-0174	1					P C BOARD	
9	211-0004	6					CONN PIN TEST PT	TP1 – TP6
10	212-0004	2					CONN M 4 PIN	
11	212-0021	4					CONN M 10 PIN	
12	212-0031	3					CONN M 12 PIN	
13	213-0004	11					SKT 16 PIN DUAL INLN	XU14, 49, 69-76, XSW1
14	213-0005	2					SKT 40 PIN DUAL INLN	XU16, XU57
15	213-0001	16					SKT 24 PIN DUAL INLN	XU1-XU8, XU26-XU33
16	230-0009	1					XTAL CLK 15.46848 MHZ	Y1
17	314-0001	3					IC NE555	U18, U36, U37
18	314-0015	1					IC 7404	U17
19	314-0018	2					IC 74LS00	U23, U62
20	314-0019	2					IC 74LS04	U25, U68

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSY DUAL GAME V.I.C.	800-0058 DWG NO	SH 3 OF 8	C REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
21	314-0040	4					IC 74LS125	U51,U52,U54,U55
22	314-0046	1					IC 74S04	U13
23	314-0058	5					IC 74LS08	U10-U12, U35,U56
24	314-0059	1					IC 74LS10	U77
25	314-0062	4					IC 74LS74	U22,U43,U58,U65
26	314-0070	1					IC 74LS86	U50
27	314-0072	2					IC 74LS174	U53,U66
28	314-0073	2					IC 74LS175	U19,U20
29	314-0076	1					IC 74LS157	U67
30	314-0078	1					IC 74LS02	U24
31	314-0099	1					IC 74LS245	U47
32	314-0093	2					IC 74LS374	U63,U64
33	314-0104	2					IC 74LS138	U9,U34
34	314-0105	3					IC 74LS253	U44-U46
35	314-0086	1					IC 74LS163	U15
36	315-0031	1					IC Z80 CPU	U16
37	315-0039	8					IC RAM 4K D O/SPEC 12V	U69-U76
38	315-0042	1					IC VIDEO INTERFACE	U57
39	316-0206	1					IC PROM 32X8 CTL	U14
40	390-0003	1					LED RED	D2

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE ASSY DUAL GAME V.I.C.	800-0058 DWG NO	SH 4 OF 8	REV C

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
41	471-0101	1					RES 100 OHM 1/2W 5%	R5
42	471-0102	14					RES 1K OHM 1/2W 5%	R11-R13 19-24,26-28,39,40
43	471-0103	3					RES 10K OHM 1/2W 5%	R10, R34 R35
44	471-0104	3					RES 100K OHM 1/2W 5%	R1, R2, R7
45	471-0183	2					RES 18K OHM 1/2W 5%	R30, R36
46	471-0220	3					RES 22 OHM 1/2W 5%	R14-R16
47	471-0221	1					RES 220 OHM 1/2W 5%	R33
48	471-0331	7					RES 330 OHM 1/2W 5%	R3,R4,R6,R17,R18,R31,R32
49	471-0471	1					RES 470 OHM 1/2W 5%	R8
50	471-0472	2					RES 4.7K OHM 1/2W 5%	R9, R37
51	475-0001	1					POT 10K CAR PCMTV	R38
52	477-0002	2					RES PACK 15 X 2.2K	RP1, RP2
53	481-0001	1					DIODE IN4002	D4
54	481-0006	2					DIODE IN914 / IN4148	D1, D3
55	482-0010	1					XSTR PE 8050	Q3
56	482-0014	4					XSTR 2N4401	Q1, Q2, Q4, Q5
57	510-0043	1					SWITCH 6 POS DIP	SW1
58	152-0007	2					CAP FILM .001µf 250V	C76, C77

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE HEAD ON SOUND	822-0002 DWG NO	SH 1 OF 6	C REV

SHT 5 & 6 "D" SIZE	DRAWN Wymena 11-9-78	ENGR
	CHECK Steven J Fay 12-22-78	APPR

LTR	DATE	REVISION DESCRIPTION	DRAFT	CHECK	APPR
A	1-8-79	RELEASED	WJB	[signature]	[signature]
B	1-25-79	ECN 273 ADDENDUM 273 2-12-79 [signature] 2-12-79	KB	[signature]	[signature]
C	5-7-79	PER ECN 308	SB	RH	RH

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PARTS LIST

TITLE: HEAD ON SOUND

DWG NO: 822-0002 | **SH** 2 **OF** 6 | **REV** C

ITEM NO	PART NO	QTY PER ASSY	DESCRIPTION	REF DES
1				
2	151-0011	6	CAP CER .01 µf 50V	C8,13,17,32,21,22
3	151-0012	5	CAP CER .1 µf 50V	C5,C12,C26,C27,C35
4	152-0001	3	CAP FILM .1 µf 100V	C31,C20,C25
5				
6	152-0012	3	CAP FILM .047 µf 200V	C2,C23,C24
7	152-0018	3	CAP FILM .01 µf 250V	C3,C6,C19
8	152-0020	3	CAP FILM .47 µf 100V	C1,C18,C16
9	153-0001	7	CAP TANT 10 µf 25V	C10,C11,C28-C30,C33,C34
10	153-0002	2	CAP TANT 1 µf 25V	C4,C9
11	153-0003	2	CAP TANT 2.2 µf 25V	C14,15
12	153-0004	1	CAP TANT 4.7 µf 25V	C7
13	170-0154	1	PCB HEAD ON SOUND	
14	212-0031	1	CONN M 12 PIN	P1
15	313-0004	1	IC LM741 EN DIP	U3
16	313-0008	1	IC LM348 DIP	U1
17	314-0001	5	IC NE555 DIP	U2,U4,U9,U12,U14
18	315-0005	4	IC 4013	U5-U8
19	315-0009	1	IC 4081	U11
20	315-0035	1	IC MM5837	U13
21	315-0043	1	IC 4069	U10

FORM NO. 001-1501

Gremlin Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE HEAD ON SOUND

DWG NO 822-0002 | SH 3 OF 6 | REV C M

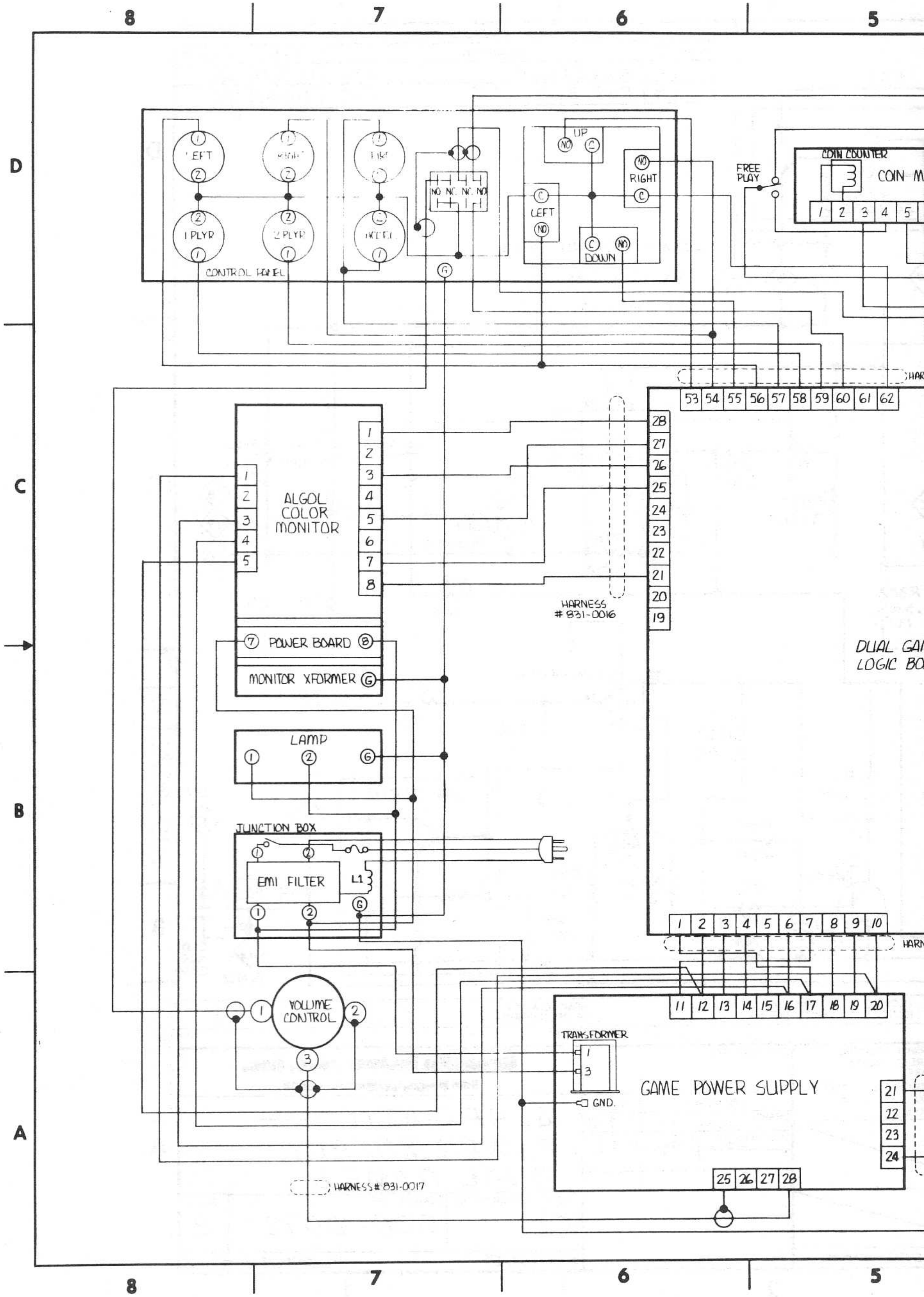
ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
22	471-0101	2					RES 100 OHM 1/2W 5%	R23,R32
23	471-0102	10					RES 1K OHM 1/2W 5%	R4,R5,R8,R14,R22,R35,
								R45,R55,R72,R48
24	471-0103	16					RES 10K OHM 1/2W 5%	R10,R12,R13,R25,
								R43,R46,R50,R56-R60,
								R64,R67,R68,R75
25	471-0104	17					RES 100K OHM 1/2W 5%	R15-R21,R24,R34,R38
								R41,R42,R62,R65,R69,
								R71,R76
26	471-0105	3					RES 1 MEG OHM 1/2W 5%	R3,R70,R77
27	471-0124	4					RES 120K OHM 1/2W 5%	R47,R51,R63,R66
28	471-0153	2					RES 15K OHM 1/2W 5%	R1,R2
29	471-0154	1					RES 150K OHM 1/2W 5%	R39
30	471-0220	1					RES 22 OHM 1/2W 5%	R49
31	471-0224	1					RES 220K OHM 1/2W 5%	R40
32	471-0394	8					RES 390K OHM 1/2W 5%	R26-R31,R44,R73
33	471-0472	3					RES 4.7K OHM 1/2W 5%	R36,R52,R74
34	471-0473	1					RES 47K OHM 1/2W 5%	R33
35	471-0474	2					RES 470K OHM 1/2W 5%	R9,R11
36	471-0682	2					RES 6.8K OHM 1/2W 5%	R53,R54
37	475-0006	2					POT 100K	R6,R7
38	481-0006	8					DIODE IN914/IN4148	D1-D8

FORM NO. 001-1501

Gremlin Industries, Inc. San Diego, California 92123	PARTS LIST	TITLE HEAD ON SOUND	822-0002 DWG NO	SH 4 OF 6	C (M) REV

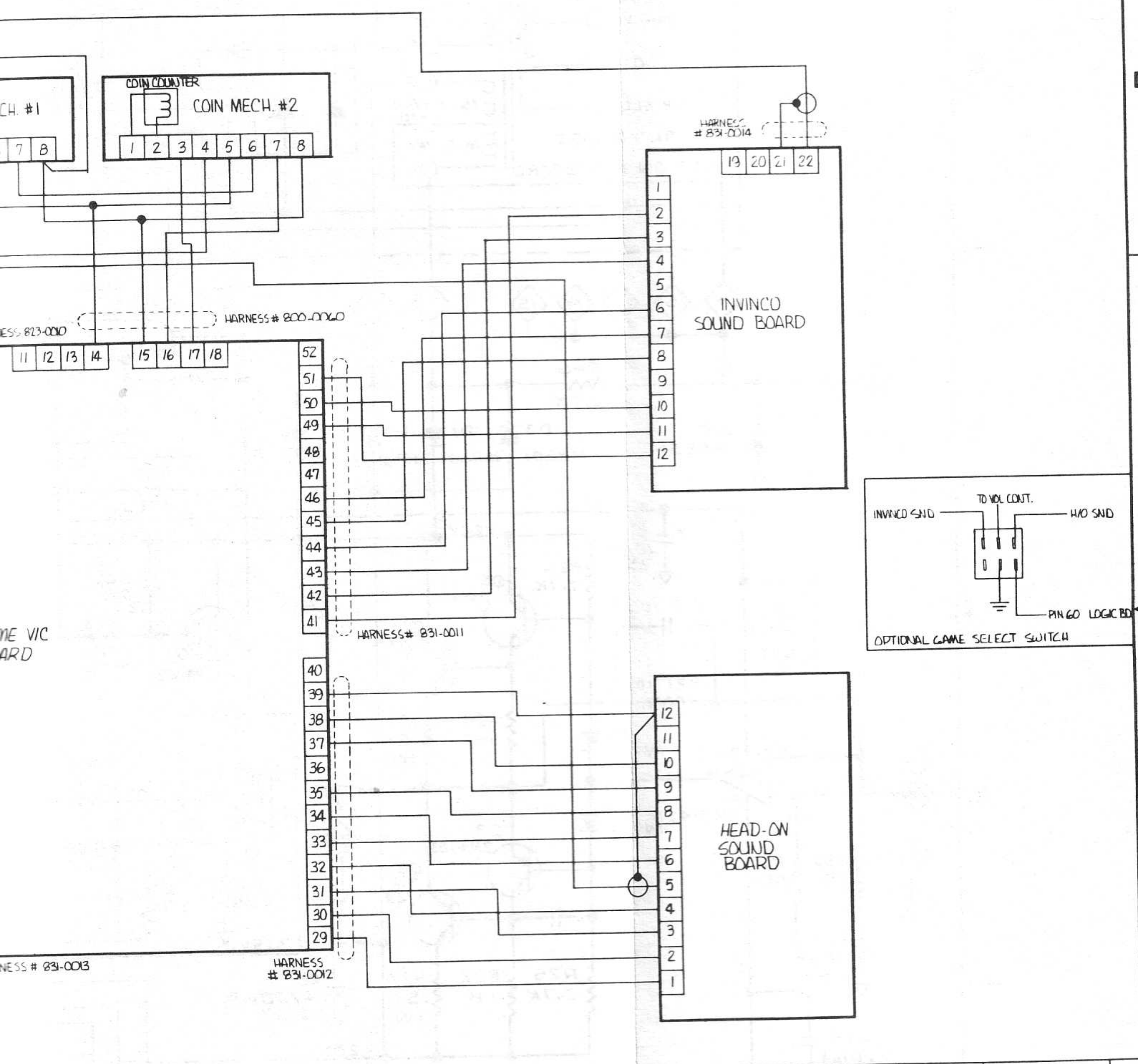
ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
39	482-0006	2					XSTR 2N4403	Q6, Q10
40	482-0014	9					XSTR 2N4401	Q2, Q5, Q7-Q9, Q11-Q14
41	482-0023	2					XSTR 2N4093	Q3, Q4
42	471-0223	1					RES 22K OHM 1/2W 5%	R37
43								

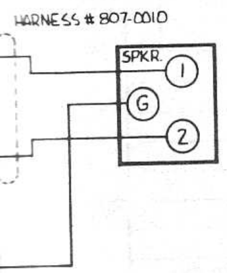
FORM NO. 001-1501



CONTROL PANEL
LEFT
1 PLYR
2 PLYR
UP
DOWN
LEFT
RIGHT
FREE PLAY
COIN COUNTER
ALGOL COLOR MONITOR
POWER BOARD
MONITOR XFORMER
LAMP
JUNCTION BOX
EMI FILTER
L1
VOLUME CONTROL
HARNESS # 831-0016
HARNESS # 831-0017
TRANSFORMER
GND.
GAME POWER SUPPLY

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	12-13-79	





QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS		DATE
DRAWN	Bn Hawthee	12-13-79
CHECKED		1-3-80

Gremlin Industries, Inc.
San Diego, California 92123

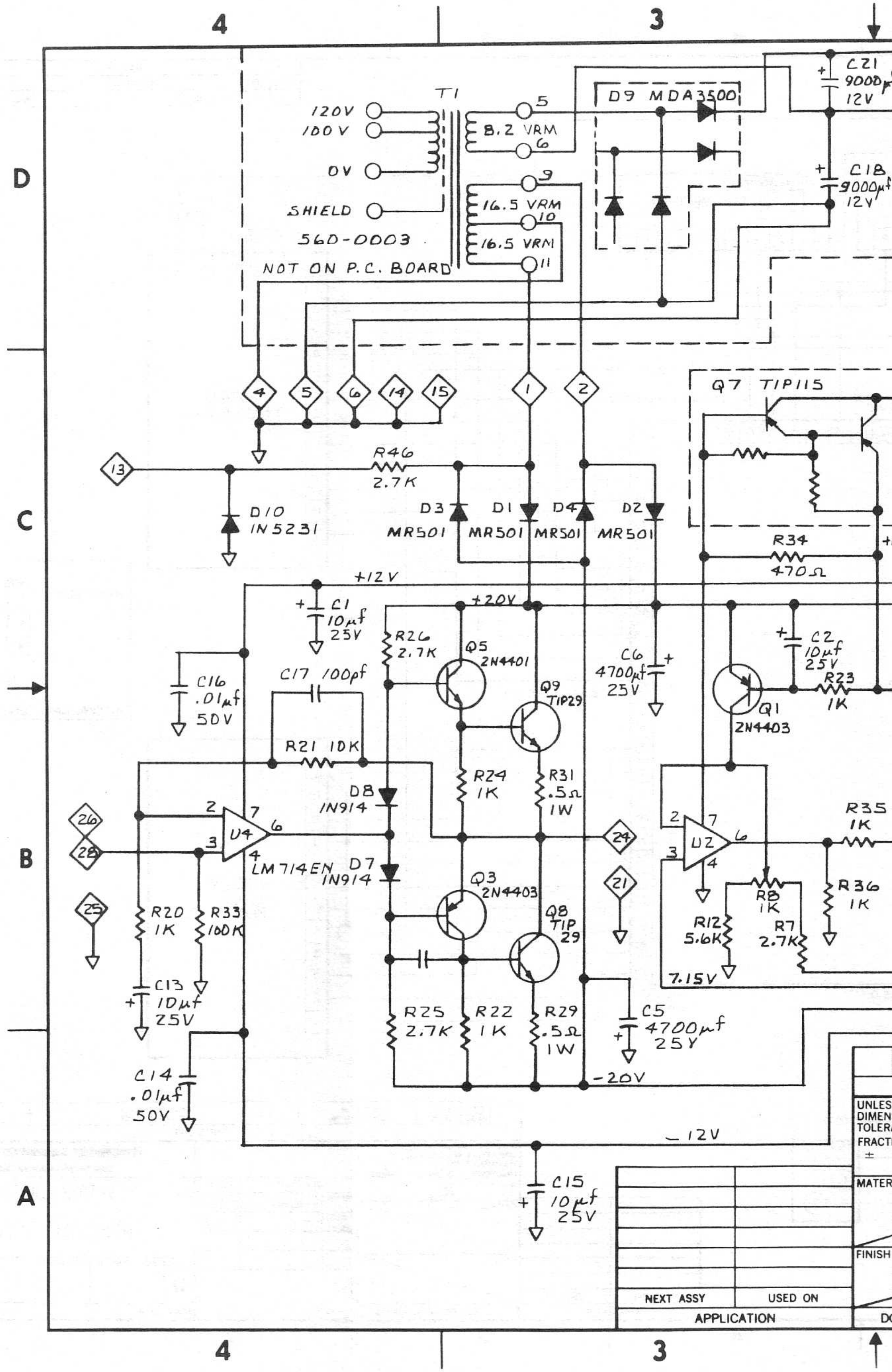
WIRING DIAGRAM

HEAD ON 2 / INVINCO

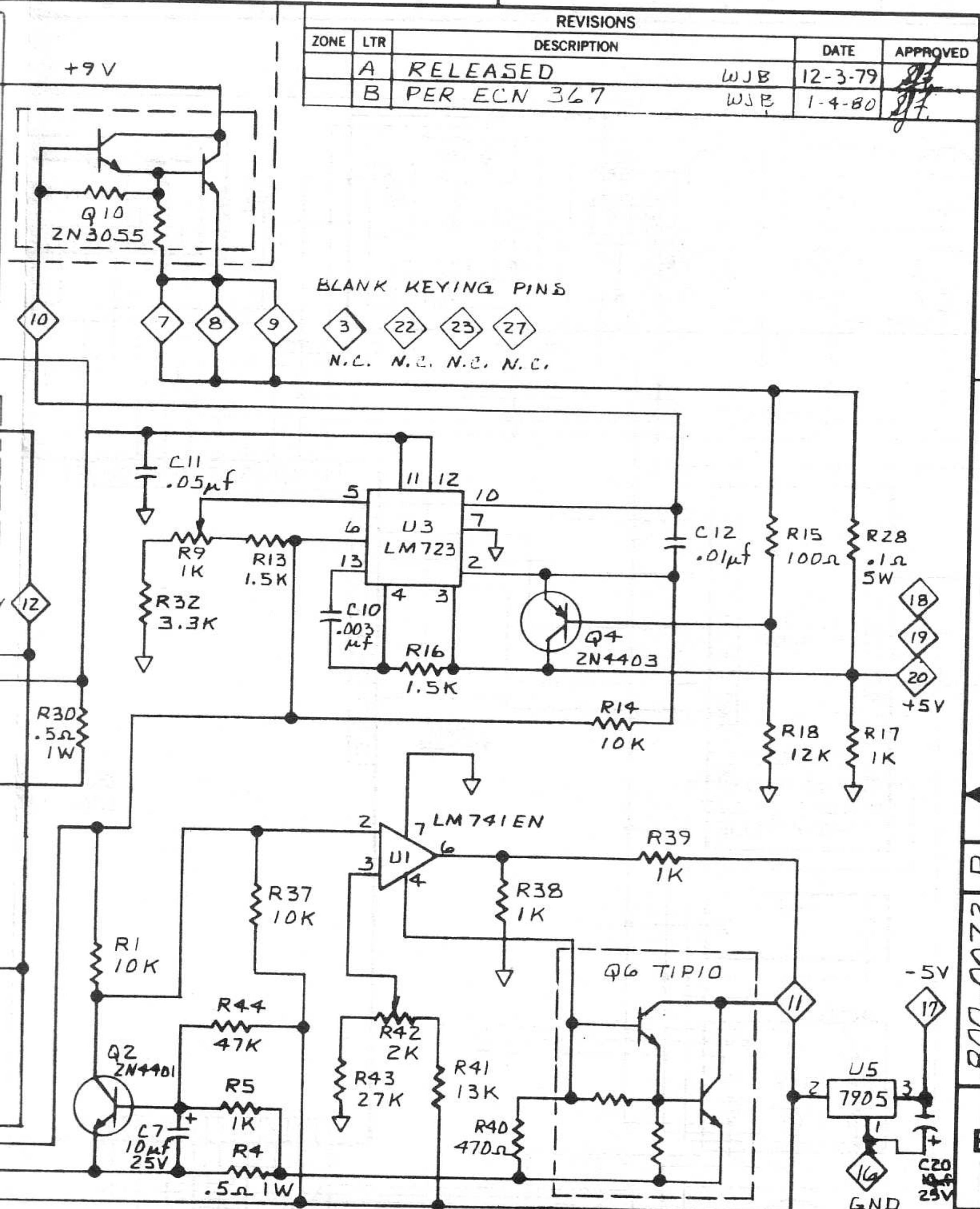
SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		731-0026	A

SCALE NONE | SHEET 5 OF 5

731-0026 A


4
3
D
C
B
A
T1
120V
100V
0V
SHIELD
560-0003
NOT ON P.C. BOARD
8.2 VRM
16.5 VRM
16.5 VRM
D9 MDA3500
C21 9000µf 12V
C18 9000µf 12V
Q7 TIP115
R46 2.7K
D10 1N5231
D3 MR501
D1 MR501
D4 MR501
D2 MR501
R34 470Ω
+12V
+20V
C1 10µf 25V
C16 .01µf 50V
C17 100pf
R26 2.7K
Q5 2N4401
Q9 TIP29
C6 4700µf 25V
C2 10µf 25V
R23 1K
Q1 2N4403
R21 10K
D8 1N914
R24 1K
R31 .5Ω 1W
U4
LM714EN
D7 1N914
Q3 2N4403
Q8 TIP 29
U2
R35 1K
R36 1K
R8 1K
R12 5.6K
R7 2.7K
7.15V
R20 1K
R33 100K
C13 10µf 25V
R25 2.7K
R22 1K
R29 .5Ω 1W
C5 4700µf 25V
-20V
C14 .01µf 50V
-12V
C15 10µf 25V
UNLESS
DIMEN
TOLERA
FRACT
MATER
FINISH
NEXT ASSY
USED ON
APPLICATION

REVISIONS					
ZONE	LTR	DESCRIPTION		DATE	APPROVED
	A	RELEASED	WJB	12-3-79	[illegible]
	B	PER ECN 367	WJB	1-4-80	[illegible]



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
DECIMALS .XX ± .XXX ± ANGLES ±

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS		DATE
DRAWN	Wynema	12-3-79
CHECKED	[illegible]	12-3-79

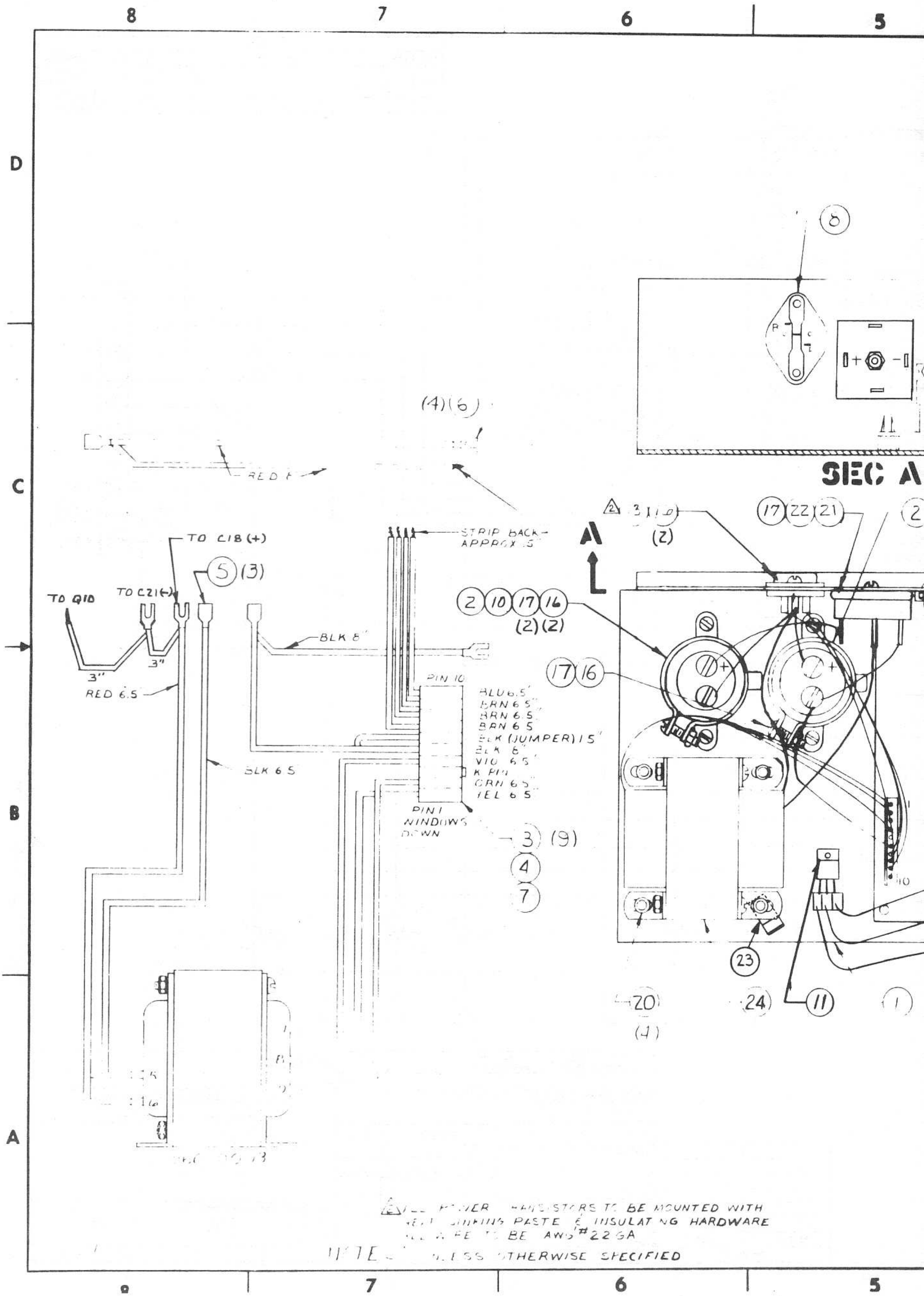
Gremlin Industries, Inc.
San Diego, California 92123

SCHEMATIC —
POWER SUPPLY
DUAL GAMES

SIZE	CODE IDENT NO.	DRAWING NO.	REV
C		800-0072	B

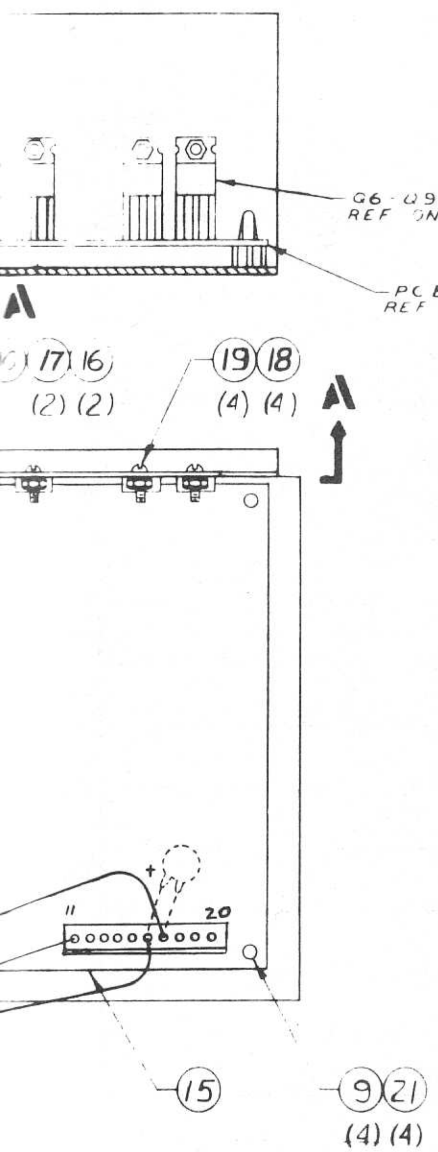
SCALE NONE — SHEET 4 OF 4

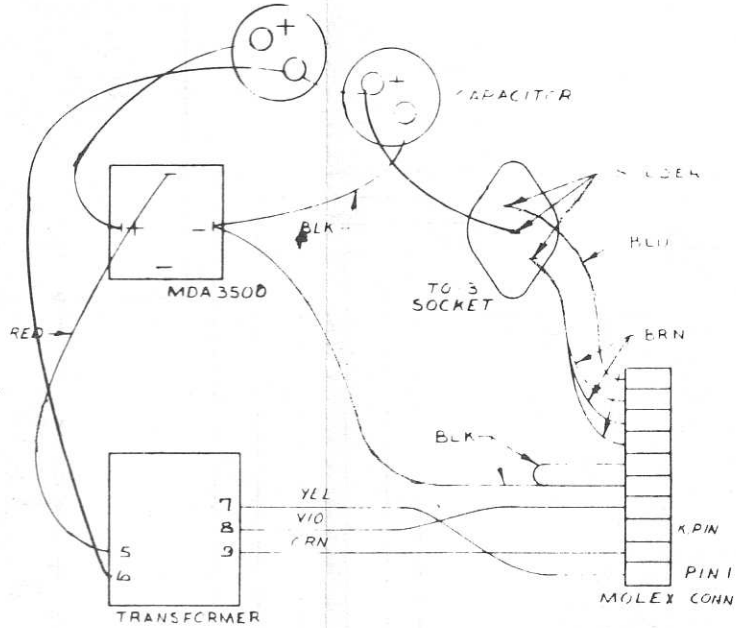
800-0072 B



8
7
6
5
D
C
B
A
(8)
SEC A
(4)(6)
RED
3 (10)
(2)
(17)(22)(21)
A
STRIP BACK APPROX .5"
TO C18 (+)
5 (3)
TO Q10
TO C21(+)
2 10 17 16
(2)(2)
BLK 8"
3"
3"
RED 6.5"
17 16
PIN 10
BLU 6.5"
BRN 6.5"
BRN 6.5"
BRN 6.5"
BLK (JUMPER) 1.5"
BLK 8"
VIO 6.5"
GRN 6.5"
YEL 6.5"
BLK 6.5
PIN 1
WINDOWS
DOWN
3 (9)
4
7
23
20
(4)
24
11
1
BE MOUNTED WITH
PASTE & INSULATING HARDWARE
BE AWG #22 GA
OTHERWISE SPECIFIED
8
7
6
5

ZONE	LTR	DESCRIPTION		DATE	APPROVED
	A	RELEASED	WJB	12-3-79	[illegible]
	B	[illegible]	[illegible]	1-1-80	[illegible]





WIRING DIAGRAM

SEE DETACHED PARTS LIST

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS XX ± XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

NEXT ASSY	USED ON
APPLICATION	

CONTRACT NO

APPROVALS		DATE
DRAWN	[illegible]	11-28-79
CHECKED	[illegible]	12-3-79

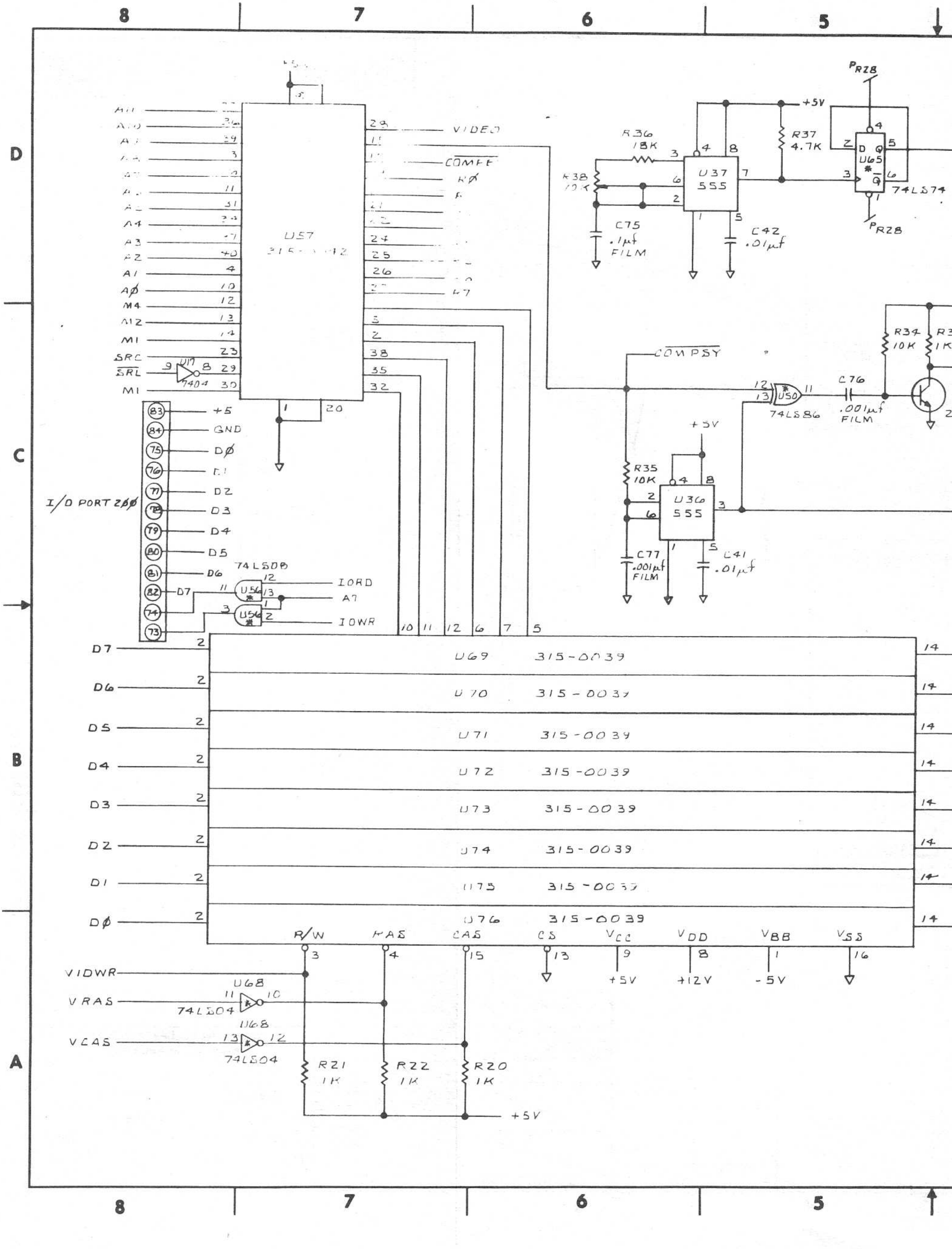
Gremlin Industries, Inc.
San Diego, California 92123

ASSY
POWER SUPPLY
DUAL GAMES

SIZE	CODE IDENT NO	DRAWING NO	REV
D		800-0072	B

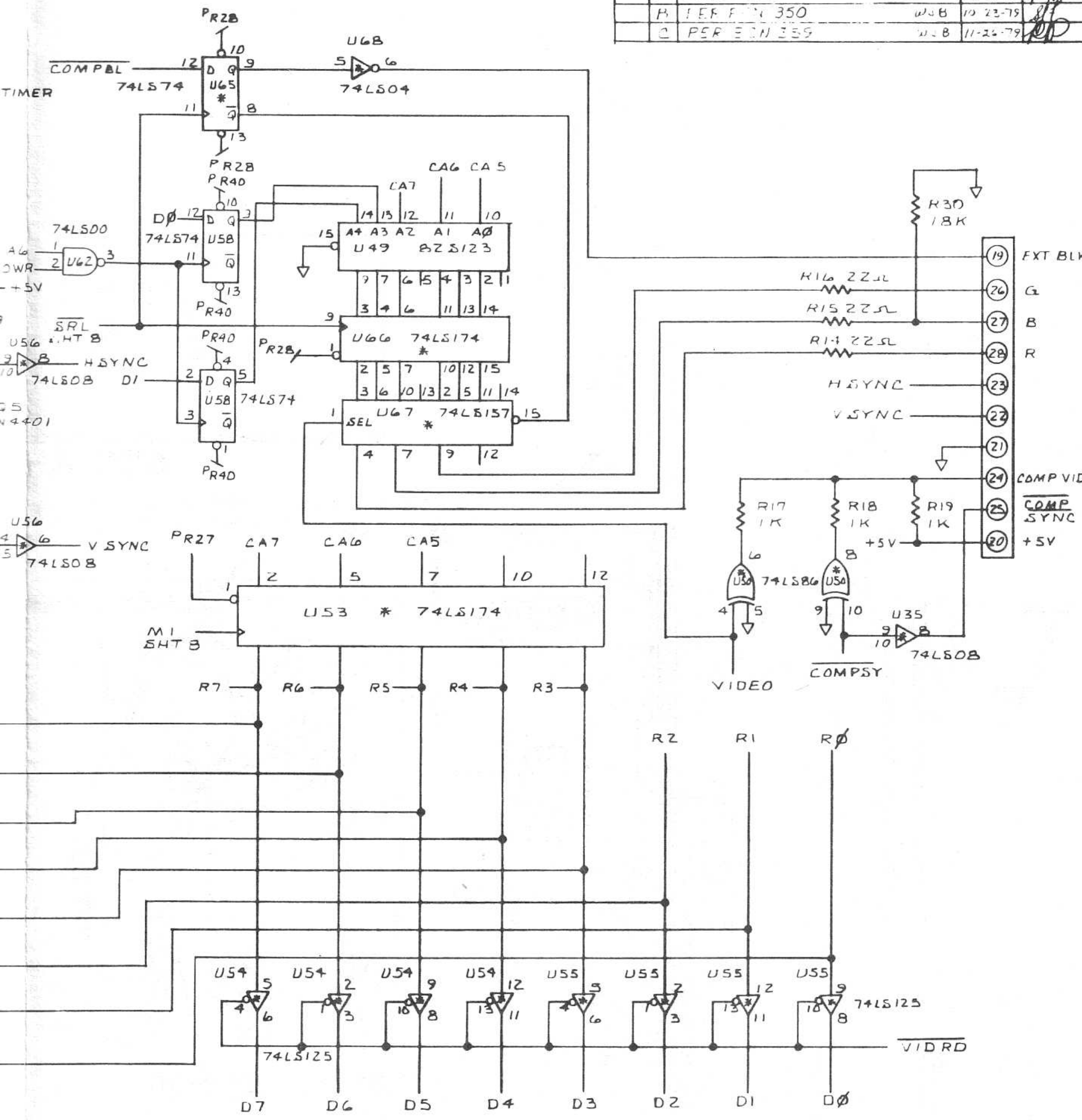
SCALE FULL — SHEET 3 OF [illegible]

500-0072 B



8
7
6
5
D
C
B
A
A9
A8
A7
A6
A5
A4
A3
A2
A1
AØ
M4
A12
M1
SRC
SRL
M1
U57
VIDEO
COMPE
U17
7404
I/O PORT 2ØØ
+5
GND
DØ
D2
D3
D4
D5
D6
D7
74LS08
U56
IORD
A7
IOWR
U69 315-0039
U70 315-0039
U71 315-0039
U72 315-0039
U73 315-0039
U74 315-0039
U75 315-0039
U76 315-0039
D7
D6
D5
D4
D3
D2
D1
DØ
R/W
RAS
CAS
CS
VCC
VDD
VBB
VSS
+5V
+12V
-5V
VIDWR
VRAS
VCAS
U68
74LS04
R21 1K
R22 1K
R20 1K
+5V
PR28
R36 18K
R38 10K
C75 .1µf FILM
U37 555
R37 4.7K
C42 .01µf
U65
74LS74
COMPSY
U50
74LS86
C76 .001µf FILM
R34 10K
+5V
R35 10K
U36 555
C77 .001µf FILM
C41 .01µf

ZONE	LTR	DESCRIPTION		DATE	APPROVED
	A	RELEASED	WJB	10-17-79	
	B	PER ECN 350	WJB	10-23-79	
	C	PER ECN 359	WJB	11-26-79	



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

CONTRACT NO.

APPROVALS		DATE
DRAWN	Wynona	9-21-79
CHECKED		10/…/79

Gremlin Industries, Inc.
San Diego, California 92126

SCHEMATIC —
DUAL GAME V.I.C.

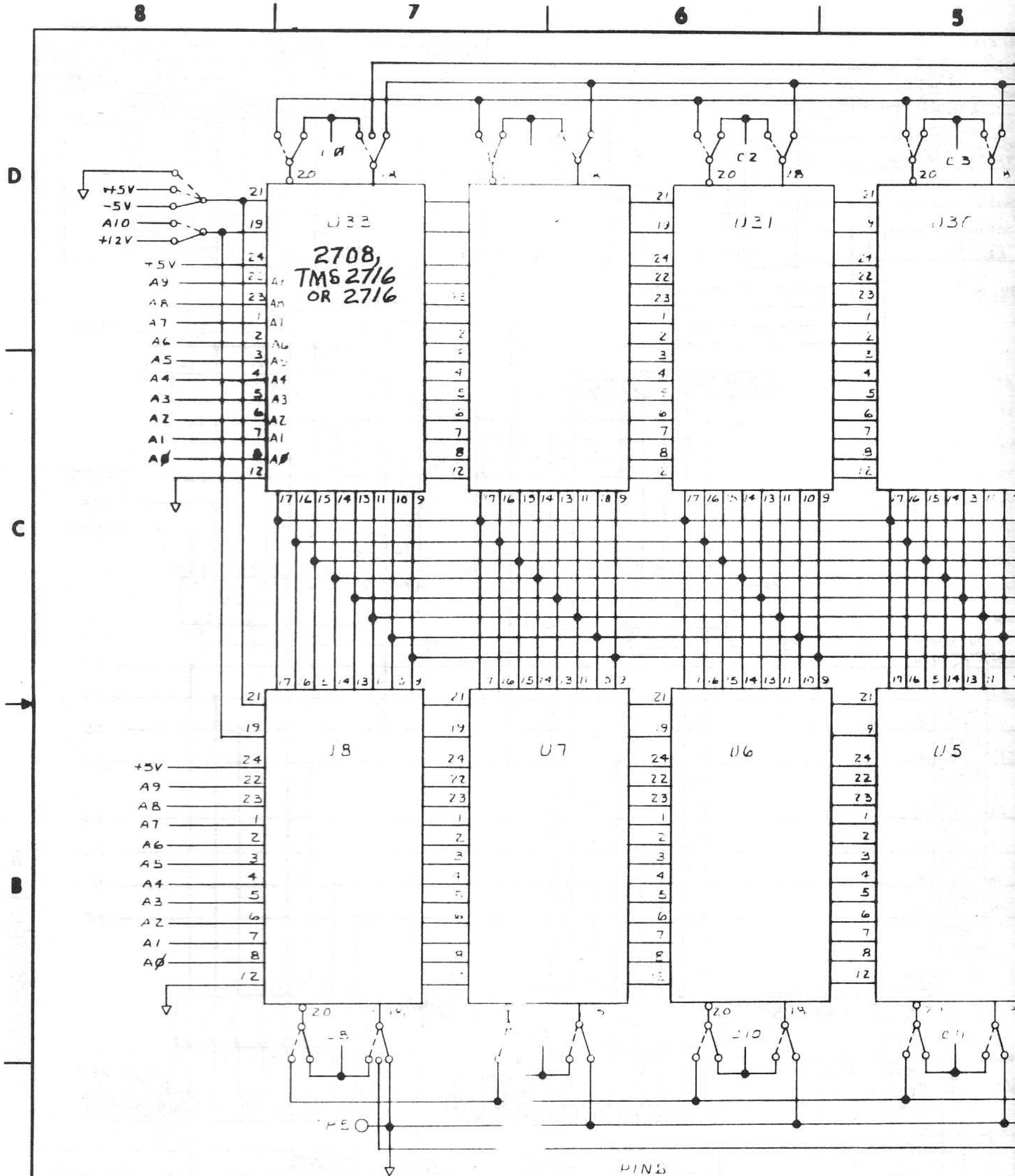
SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		800-0058	C

SCALE NONE — SHEET 6 OF 8

NEXT ASSY	USED ON
APPLICATION	

DO NOT SCALE DRAWING

800-0058 C

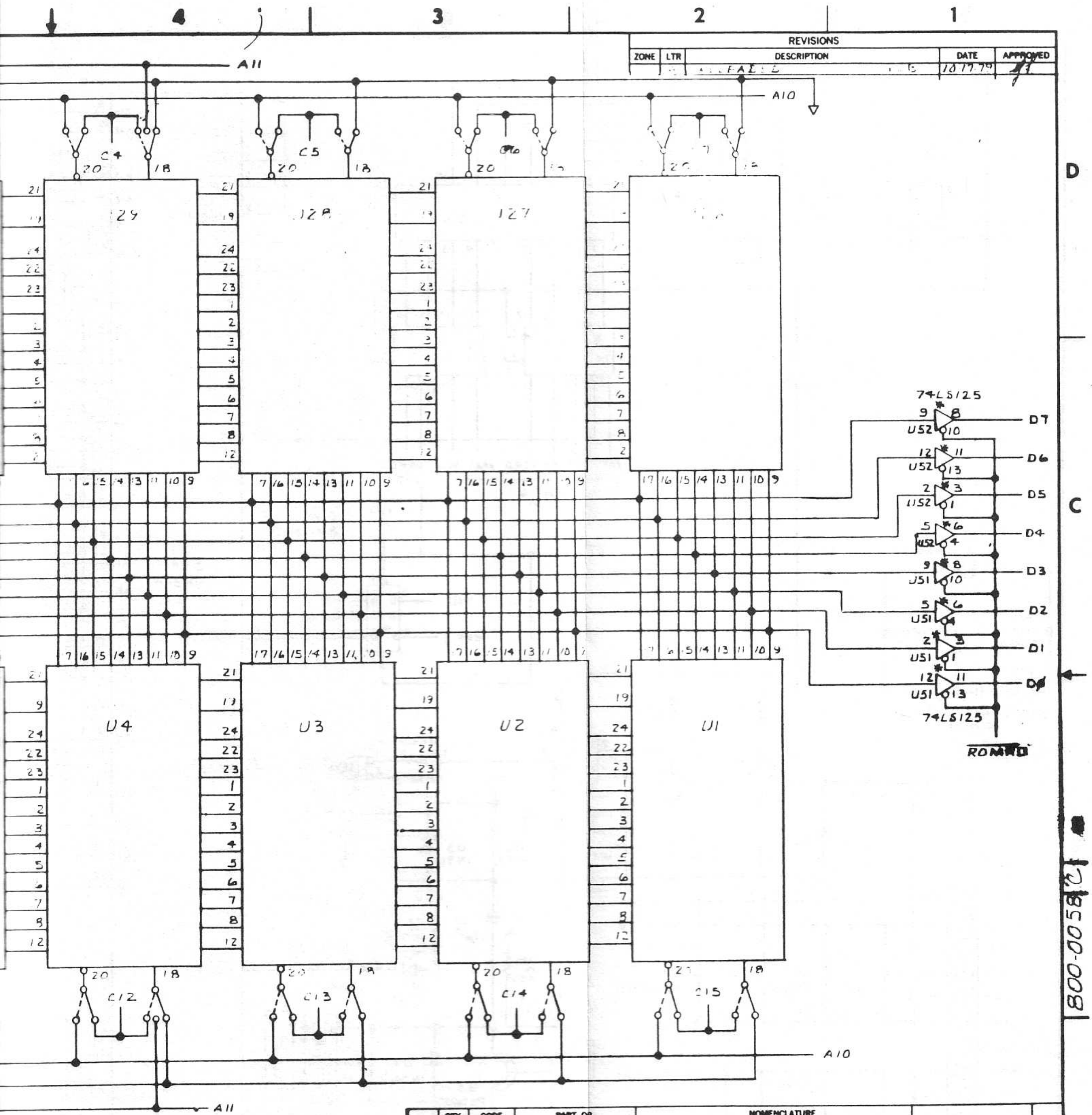


PINS

	[illegible]	[illegible]	[illegible]	21	SOCKETS USED	JUMPERS
	[illegible]	+12V	CN	-5V	ALL	E1-E2, E5-[illegible] E11-E12
[illegible]	CN	+12V	A10	-5V	U33, U31, U29, U27, U8, U6, U4, U2	E1-E3, E5[illegible] E11-E12
[illegible]	[illegible]	A10	CN	+5V	U33, U31, U29, U27, U8, U6, U4, U2	E1-E3, E5[illegible] E11-E12
2732	CN	A10	CN	A11	U33, U29, U8, U4	E1-E3, E5-E14,[illegible]
32 K ROM	A11	A10	CN	GND	U33, U29, U8, U4	E1-E3, E5-E14,[illegible]

* [illegible]

NOTES: [illegible]



REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
		RELEASED	10 17 79	

(SHT 8)
E8-E9,
E6, E8-E9,
E6, E8-E9,
E8-E9, E11-E12
E9, E11-E12

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS		DATE
DRAWN		9 20 79
CHECKED		10/1/79

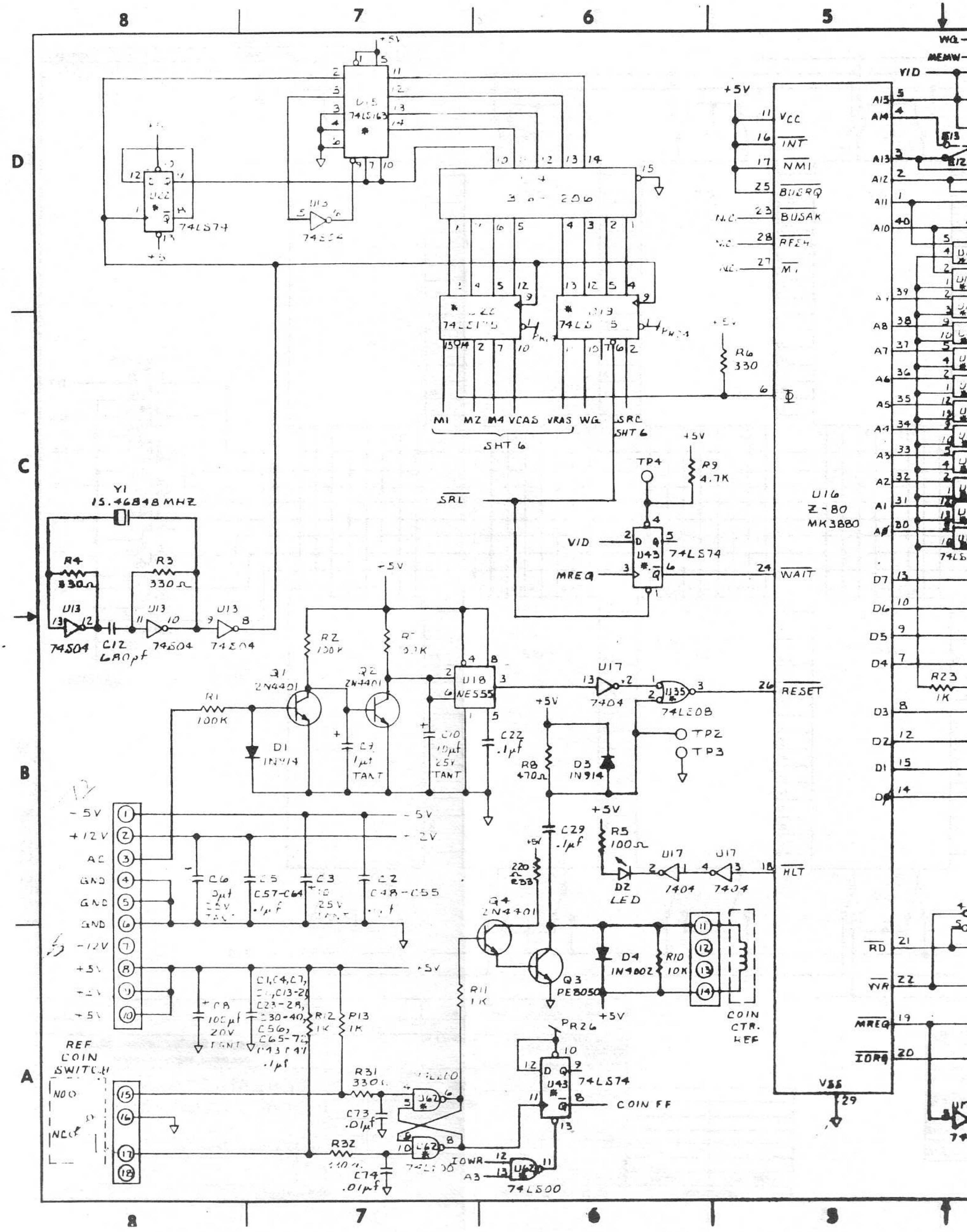
Gremlin Industries, Inc.
San Diego, California

SCHEMATIC —
DUAL GAME V.I.C.

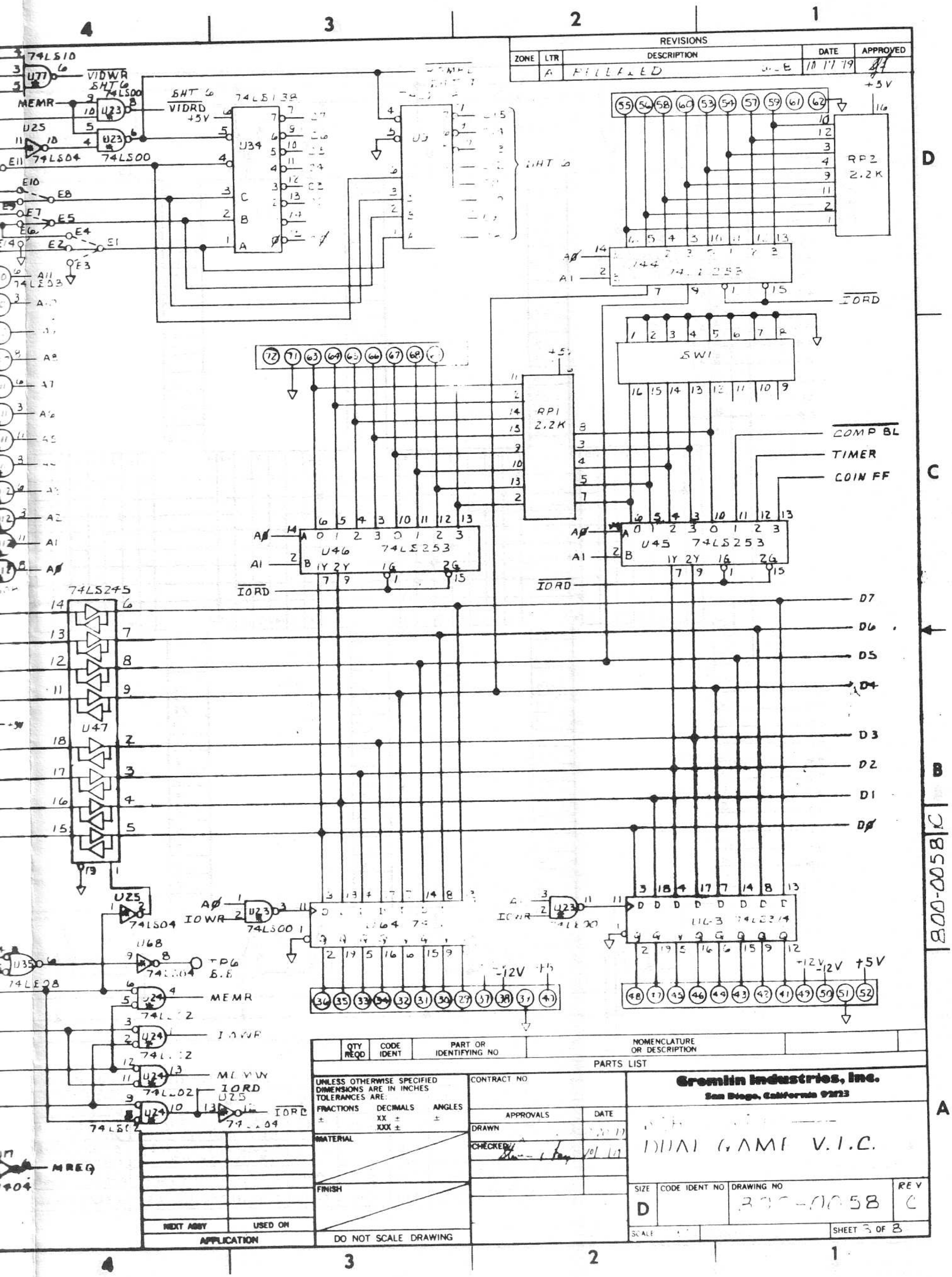
SIZE D | CODE IDENT NO. | DRAWING NO. 800-0058 | REV C

SCALE NONE | SHEET 7 OF 8

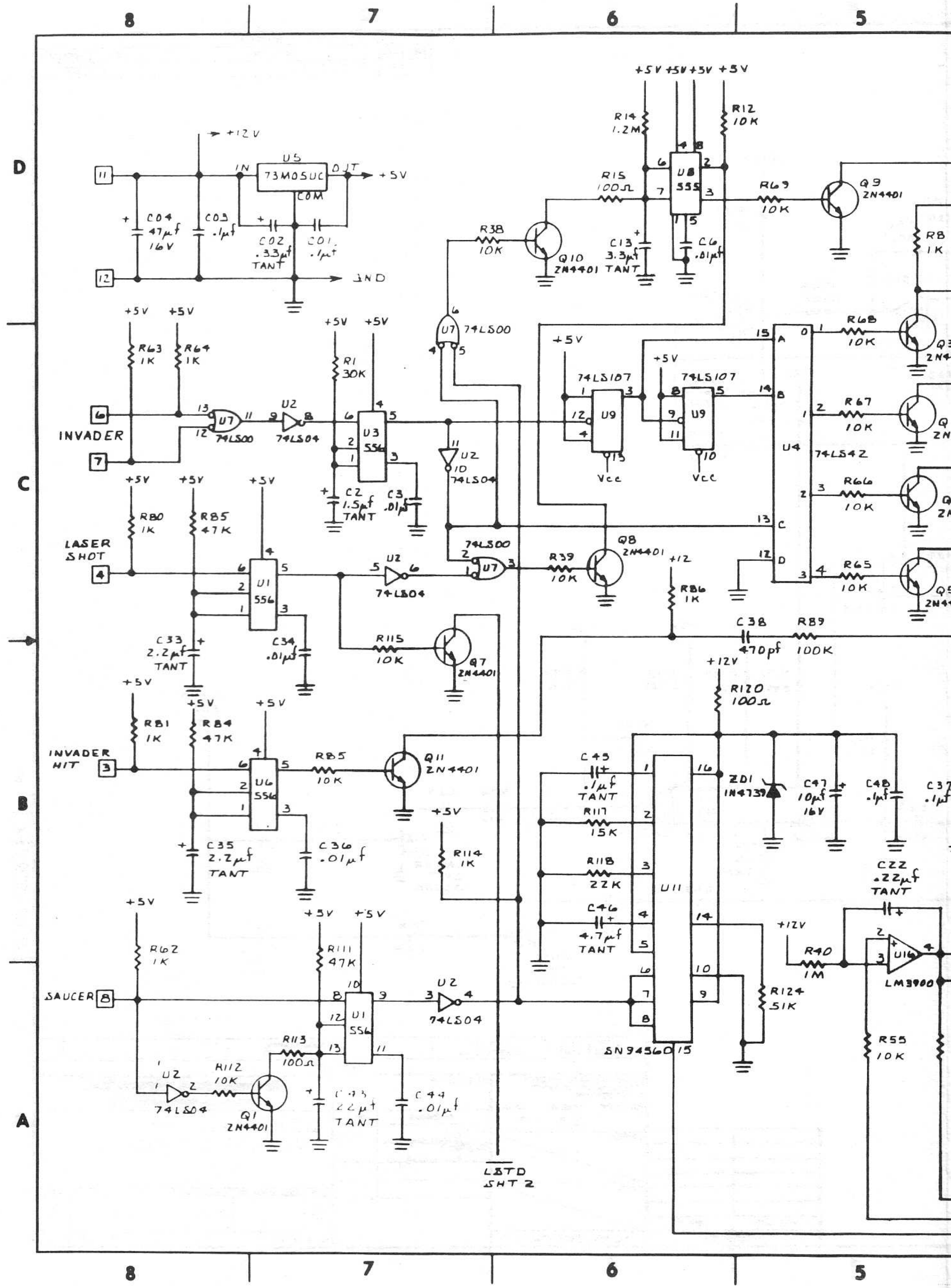
800-0058 C



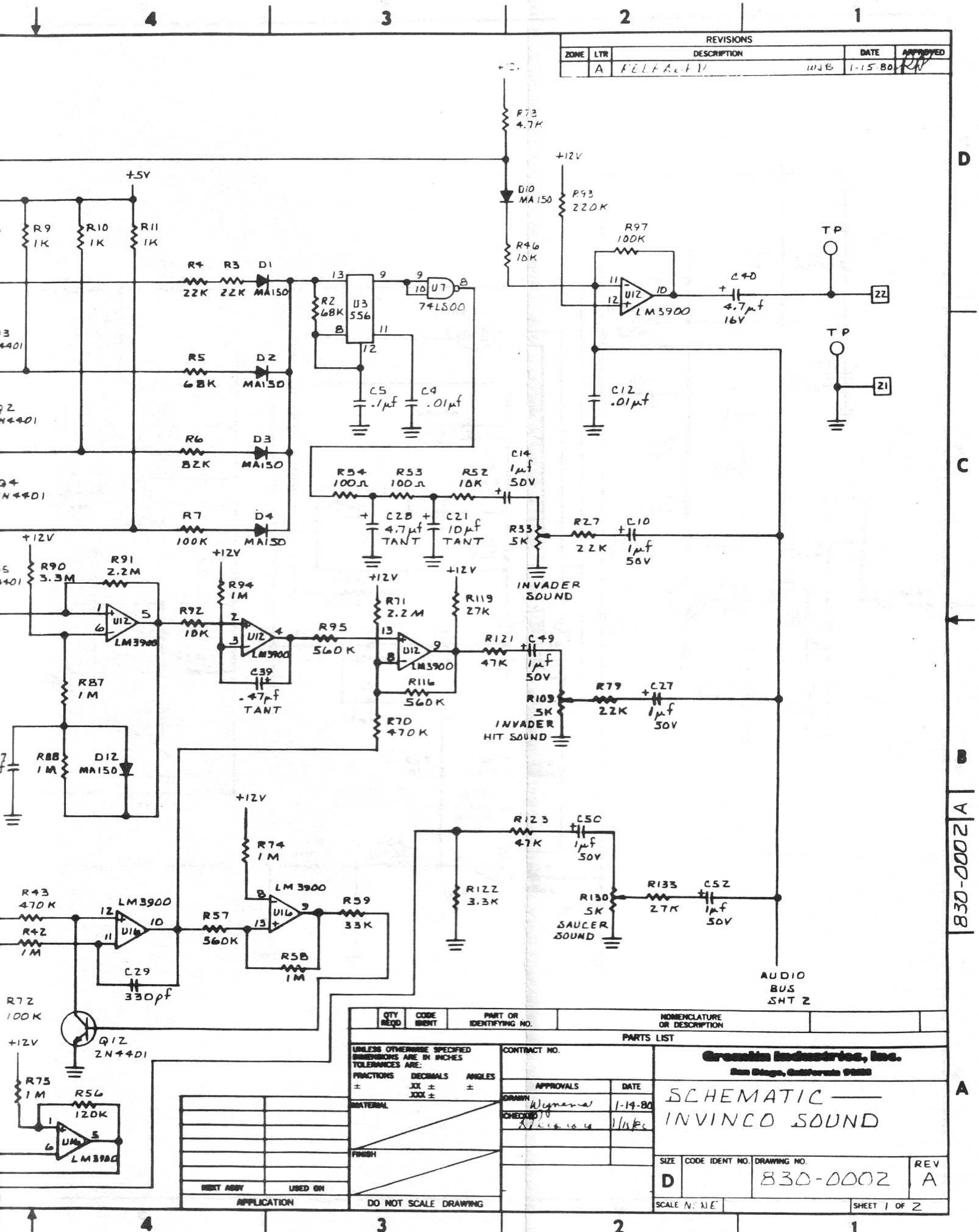
8
7
6
5
D
C
B
A
U15
74LS163
U22
74LS74
U13
74S04
U14
U20
74LS175
U19
74LS175
M1
M2
M4
VCAS
VRAS
WG
SRC
SHT 6
SRL
TP4
R9
4.7K
VID
MREQ
U43
74LS74
WAIT
Y1
15.46848 MHZ
R4
330Ω
R3
330Ω
C12
680pf
R6
330
U16
Z-80
MK3880
+5V
VCC
INT
NMI
BUSRQ
BUSAK
RFSH
M1
Q1
2N4401
Q2
2N4401
R1
100K
D1
1N914
U18
NE555
C22
.1μf
U17
7404
U35
74LS08
RESET
TP2
TP3
R8
470Ω
D3
1N914
C29
.1μf
R5
100Ω
D2
LED
HLT
Q4
2N4401
Q3
PE8050
D4
1N4002
R10
10K
COIN
CTR.
REF
R11
1K
PR26
COIN FF
74LS74
74LS00
IOWR
A3
R31
330
R32
C73
.01μf
C74
.01μf
R12
1K
R13
1K
REF
COIN
SWITCH
NO
NC
-5V
+12V
AC
GND
-12V
+5V
C6
C5
C57-C64
.1μf
C3
C2
C48-C55
C8
100μf
20V
TANT
C1,C4,C7,
C13-20,
C23-28,
C30-40,
C56,
C65-72
.1μf
RD
WR
MREQ
IORQ
VSS
A15
A14
A13
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
D7
D6
D5
D4
D3
D2
D1
D0
R23
1K
74LS
WG
MEMW
VID



REVISIONS
ZONE | LTR | DESCRIPTION | DATE | APPROVED
A | RELEASED | 10 17 79
74LS10
U77
VIDWR
MEMR
74LS00
U23
U25
74LS04
74LS00
SHT 6
VIDRD
+5V
74LS138
U34
U3
SHT 6
RP2
2.2K
+5V
U44
74LS253
A∅
A1
IORD
SW1
RP1
2.2K
+5V
COMP BL
TIMER
COIN FF
U46
74LS253
U45
74LS253
74LS245
U47
D7
D6
D5
D4
D3
D2
D1
D∅
U25
74LS04
IOWR
74LS00
U64
U68
74LS04
TP6
U63
74LS374
U35
74LS08
U24
MEMR
IOWR
MEWR
IORD
-12V
+5
+12V
-12V
+5V
MREQ
QTY REQD | CODE IDENT | PART OR IDENTIFYING NO | NOMENCLATURE OR DESCRIPTION
PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± | DECIMALS XX ± XXX ± | ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING
NEXT ASSY | USED ON
APPLICATION
CONTRACT NO
APPROVALS | DATE
DRAWN
CHECKED
Gremlin Industries, Inc.
San Diego, California 92123
DUAL GAME V.I.C.
SIZE D
CODE IDENT NO
DRAWING NO 800-0058
REV C
SCALE
SHEET 3 OF 8
800-0058 C



8
7
6
5
D
C
B
A
+12V
U5
73M05UC
IN
OUT
+5V
COM
C04
47μf
16V
C03
.1μf
C02
.33μf
TANT
C01
.1μf
GND
11
12
+5V +5V +5V +5V
R14
1.2M
R12
10K
U8
555
R15
100Ω
R69
10K
Q9
2N4401
R38
10K
Q10
2N4401
C13
3.3μf
TANT
C6
.01μf
R8
1K
U7 74LS00
R63
1K
R64
1K
INVADER
6
7
U2
74LS04
74LS00
R1
30K
U3
556
C2
1.5μf
TANT
C3
.01μf
74LS107
U9
Vcc
U4
74LS42
R68
10K
R67
10K
R66
10K
R65
10K
LASER SHOT
4
R80
1K
R85
47K
U1
556
C33
2.2μf
TANT
C34
.01μf
R115
10K
Q7
2N4401
R39
10K
Q8
2N4401
+12
R86
1K
C38
470pf
R89
100K
+12V
R120
100Ω
INVADER HIT
3
R81
1K
R84
47K
U6
556
R85
10K
Q11
2N4401
C35
2.2μf
TANT
C36
.01μf
R114
1K
C45
.1μf
TANT
R117
15K
R118
22K
C46
4.7μf
TANT
U11
SN94560
ZD1
1N4739
C47
10μf
16V
C48
.1μf
C37
.1μf
C22
.22μf
TANT
R40
1M
U16
LM3900
R124
51K
R55
10K
SAUCER
8
R62
1K
U2
74LS04
R112
10K
Q1
2N4401
R113
100Ω
R111
47K
U1
556
C43
22μf
TANT
C44
.01μf
LSTD
SHT 2



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
DO NOT SCALE DRAWING

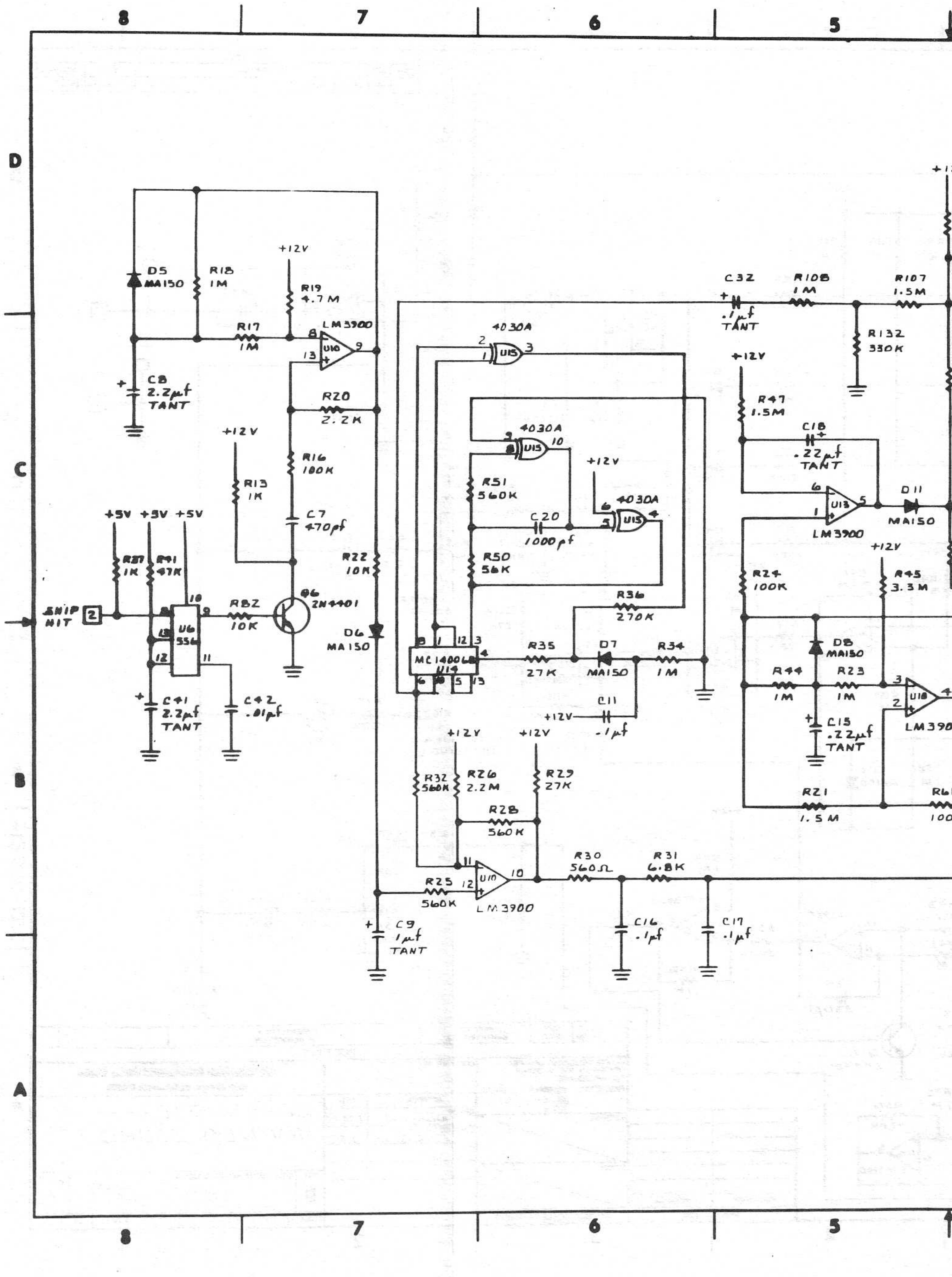
CONTRACT NO.

APPROVALS	DATE
DRAWN Wyneme	1-14-80
CHECKED	1/15/80

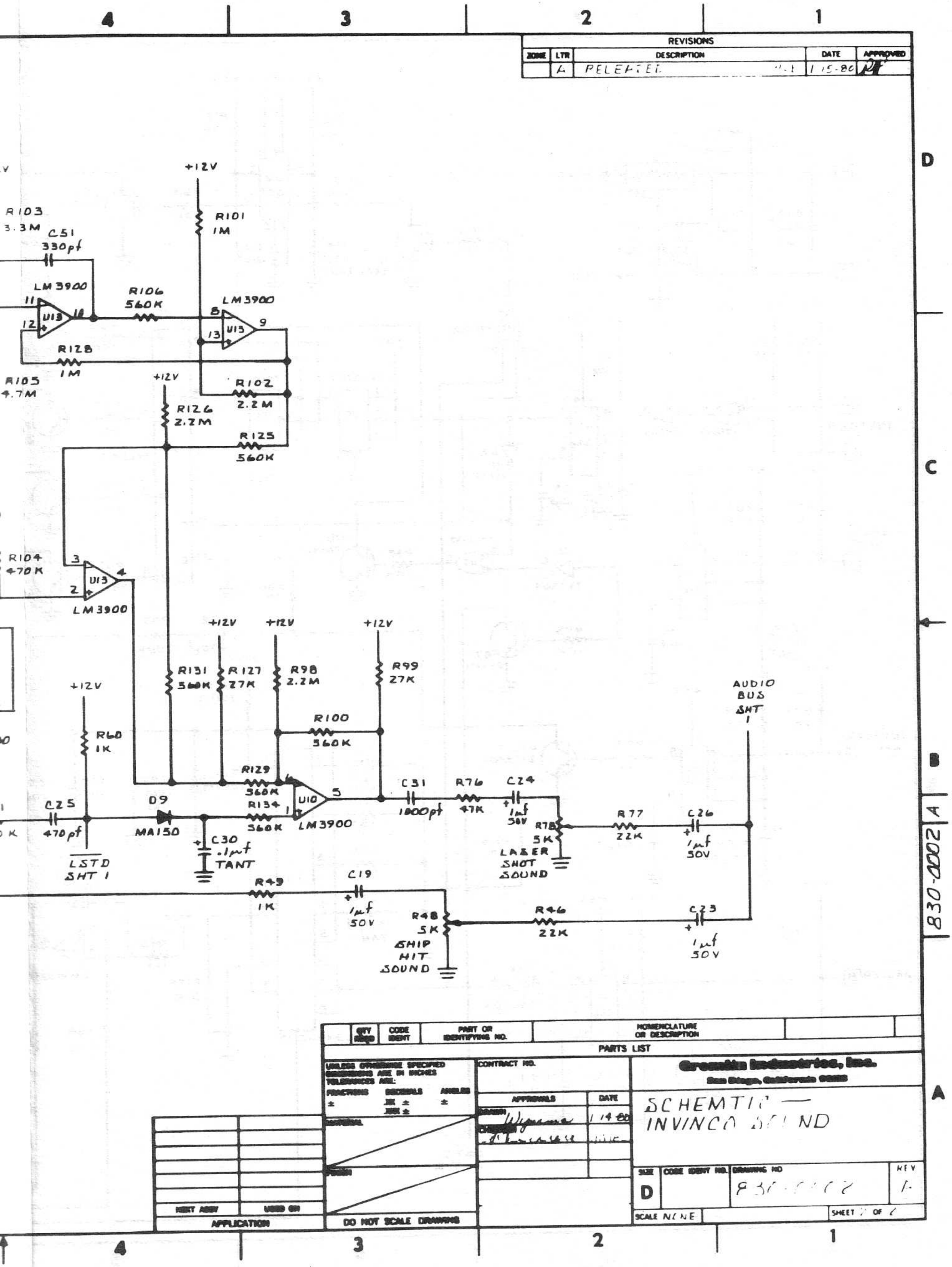
Gremlin Industries, Inc.
San Diego, California

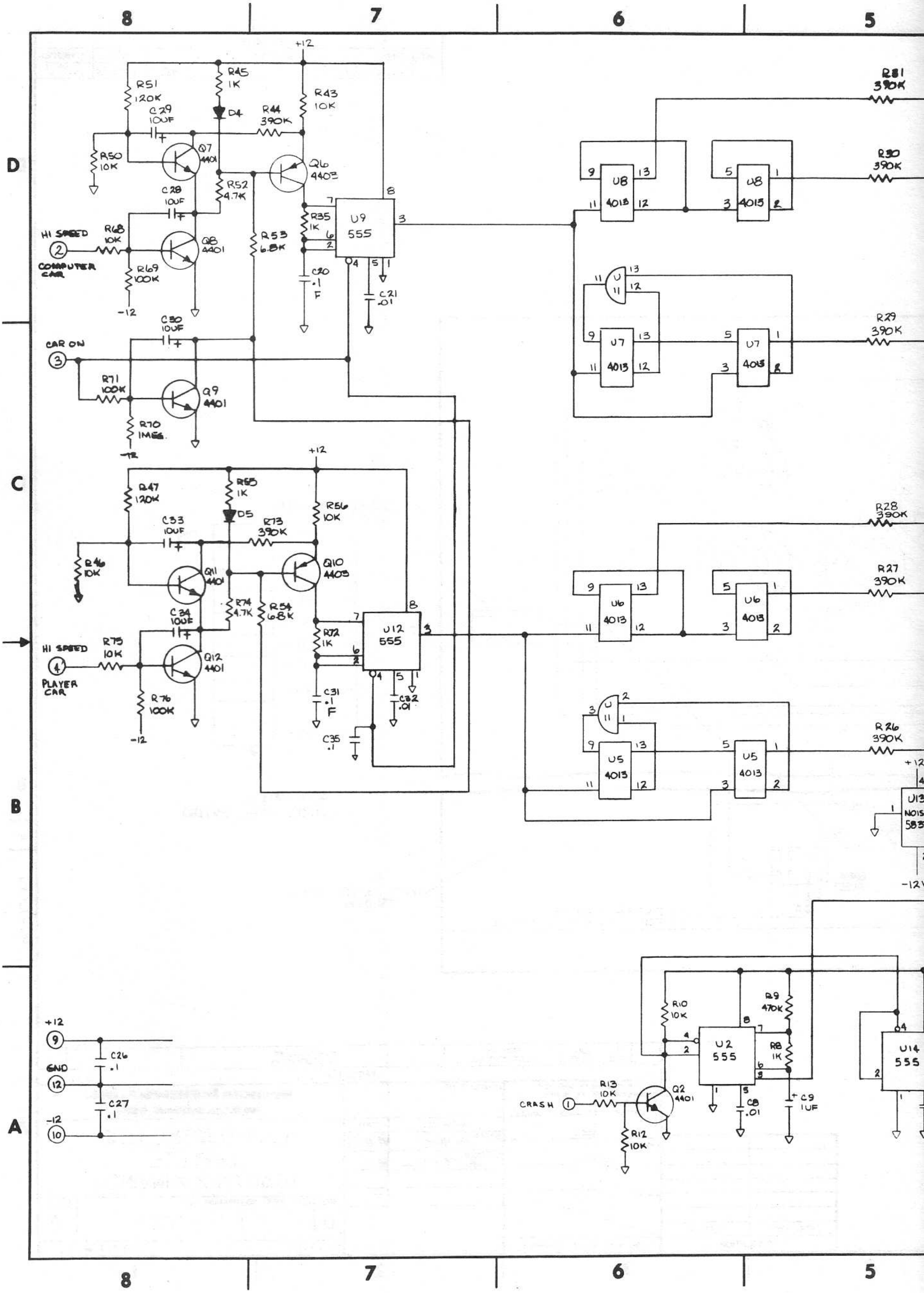
SCHEMATIC — INVINCO SOUND

SIZE D | CODE IDENT NO. | DRAWING NO. 830-0002 | REV A
SCALE NONE | SHEET 1 OF 2

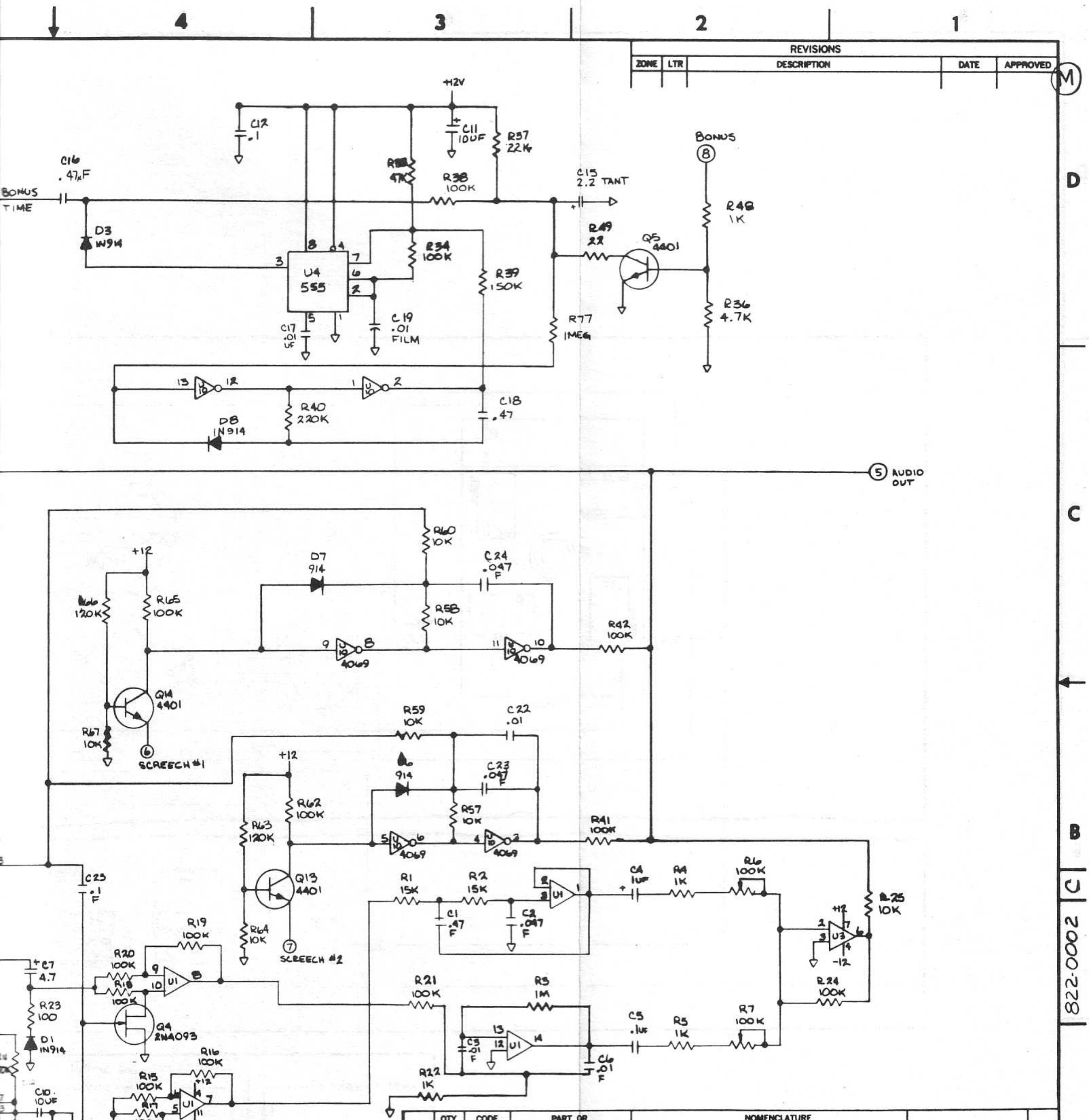


8
7
6
5
D
C
B
A
SHIP HIT
2
+5V
+5V
+5V
R37 1K
R41 47K
U6 556
C41 2.2µf TANT
C42 .01µf
R82 10K
Q6 2N4401
+12V
R13 1K
R16 100K
C7 470pf
D5 MA150
R18 1M
R19 4.7M
R17 1M
LM3900
U10
C8 2.2µf TANT
R20 2.2K
R22 10K
D6 MA150
C9 1µf TANT
R25 560K
LM3900
R32 560K
R26 2.2M
R28 560K
R29 27K
R30 560Ω
R31 6.8K
C16 .1µf
C17 .1µf
4030A
U15
R51 560K
R50 56K
C20 1000pf
MC14006B U14
R35 27K
D7 MA150
R34 1M
R36 270K
C11 .1µf
C32 .1µf TANT
R108 1M
R107 1.5M
R132 330K
R47 1.5M
C18 .22µf TANT
U13
LM3900
D11 MA150
R24 100K
R45 3.3M
D8 MA150
R44 1M
R23 1M
U18
C15 .22µf TANT
R21 1.5M


REVISIONS
ZONE
LTR
DESCRIPTION
DATE
APPROVED
A
1-15-80
+12V
R103
3.3M
C51
330pf
R101
1M
LM3900
R106
560K
LM3900
U13
U13
R128
1M
R105
4.7M
R102
2.2M
R126
2.2M
R125
560K
R104
470K
U13
LM3900
R131
560K
R127
27K
R98
2.2M
R99
27K
R100
560K
R60
1K
R129
560K
R134
560K
U10
LM3900
C25
470pf
D9
MA150
C30
.1μf
TANT
LSTD
SHT 1
C31
1000pf
R76
47K
C24
1μf
50V
R78
5K
LASER
SHOT
SOUND
R77
22K
C26
1μf
50V
AUDIO
BUS
SHT
1
R49
1K
C19
1μf
50V
R48
5K
SHIP
HIT
SOUND
R46
22K
C23
1μf
50V
830-0002
A
QTY REQD
CODE IDENT
PART OR IDENTIFYING NO.
NOMENCLATURE OR DESCRIPTION
PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS
DECIMALS
ANGLES
CONTRACT NO.
APPROVALS
DATE
DRAWN
CHECKED
1-14-80
MATERIAL
FINISH
Gremlin Industries, Inc.
San Diego, California
SCHEMTIC —
INVINCO SOUND
SIZE
D
CODE IDENT NO.
DRAWING NO
REV
A
SCALE NONE
SHEET
OF
NEXT ASSY
USED ON
APPLICATION
DO NOT SCALE DRAWING



8
7
6
5
D
C
B
A
+12
R51 120K
R45 1K
D4
R43 10K
C29 10UF
R44 390K
R50 10K
Q7 4401
Q6 4403
R52 4.7K
C28 10UF
R35 1K
U9 555
HI SPEED
R68 10K
Q8 4401
R53 6.8K
COMPUTER CAR
R69 100K
C20 .1 F
C21 .01
-12
C30 10UF
CAR ON
R71 100K
Q9 4401
R70 1MEG.
R47 120K
R55 1K
D5
R56 10K
C33 10UF
R73 390K
R46 10K
Q11 4401
Q10 4403
R74 4.7K
R54 6.8K
C34 10UF
U12 555
R72 1K
R75 10K
Q12 4401
PLAYER CAR
R76 100K
C31 .1 F
C32 .01
C35 .1
R81 390K
R30 390K
U8 4013
U7 4013
R29 390K
R28 390K
R27 390K
U6 4013
U5 4013
R26 390K
U13 NOIS 583
-12V
GND
C26 .1
C27 .1
R10 10K
R9 470K
U2 555
R8 1K
R13 10K
CRASH
Q2 4401
C8 .01
C9 1UF
R12 10K
U14 555



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

CONTRACT NO.

APPROVALS	DATE
DRAWN [signature]	11-6-78
CHECKED [signature]	12-22-78

MATERIAL

FINISH

DO NOT SCALE DRAWING

NEXT ASSY	USED ON
722-0001	HEAD ON

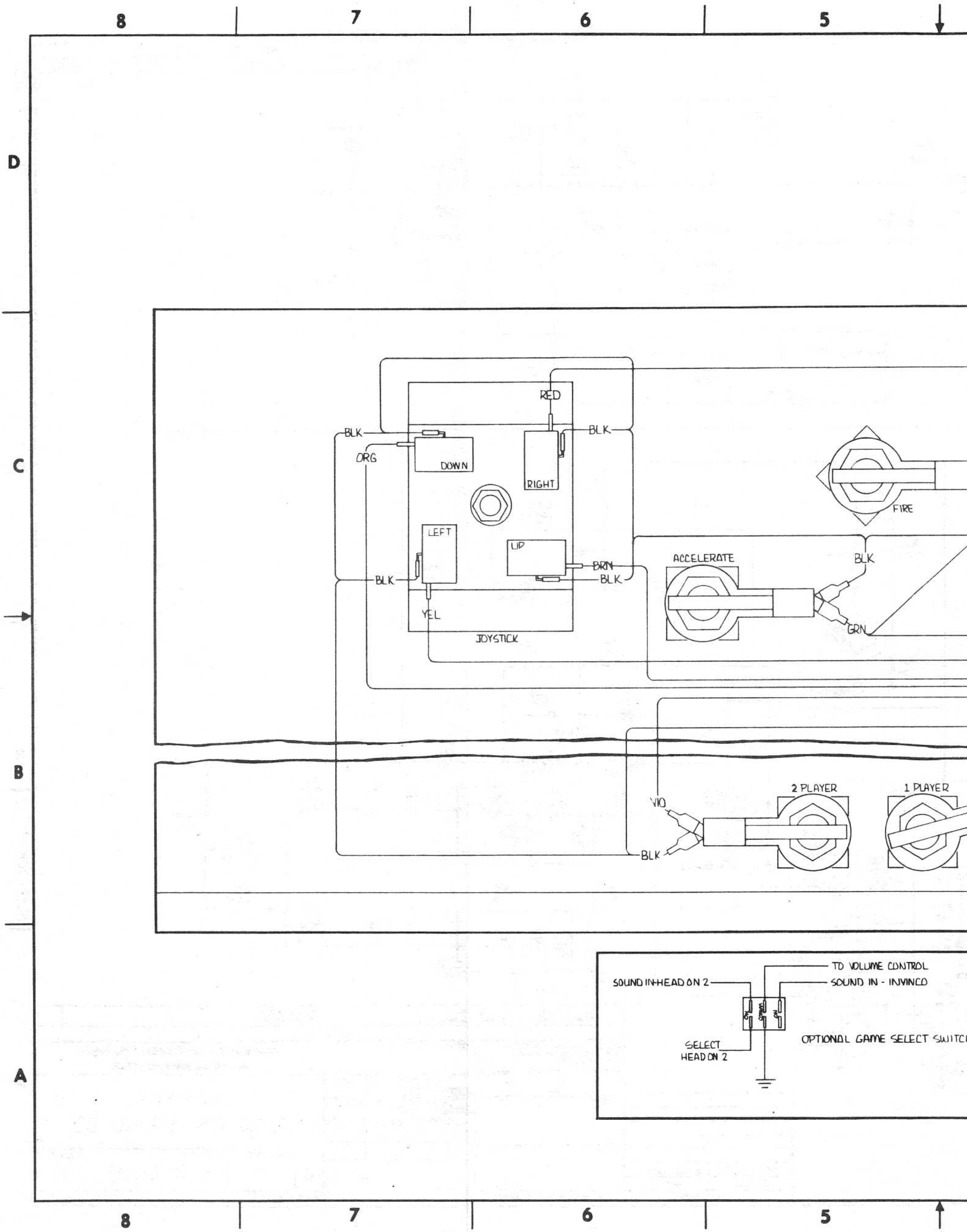
APPLICATION

Gremlin Industries, Inc.
San Diego, California 92126

SCHEMATIC
HEAD ON SOUND BD.

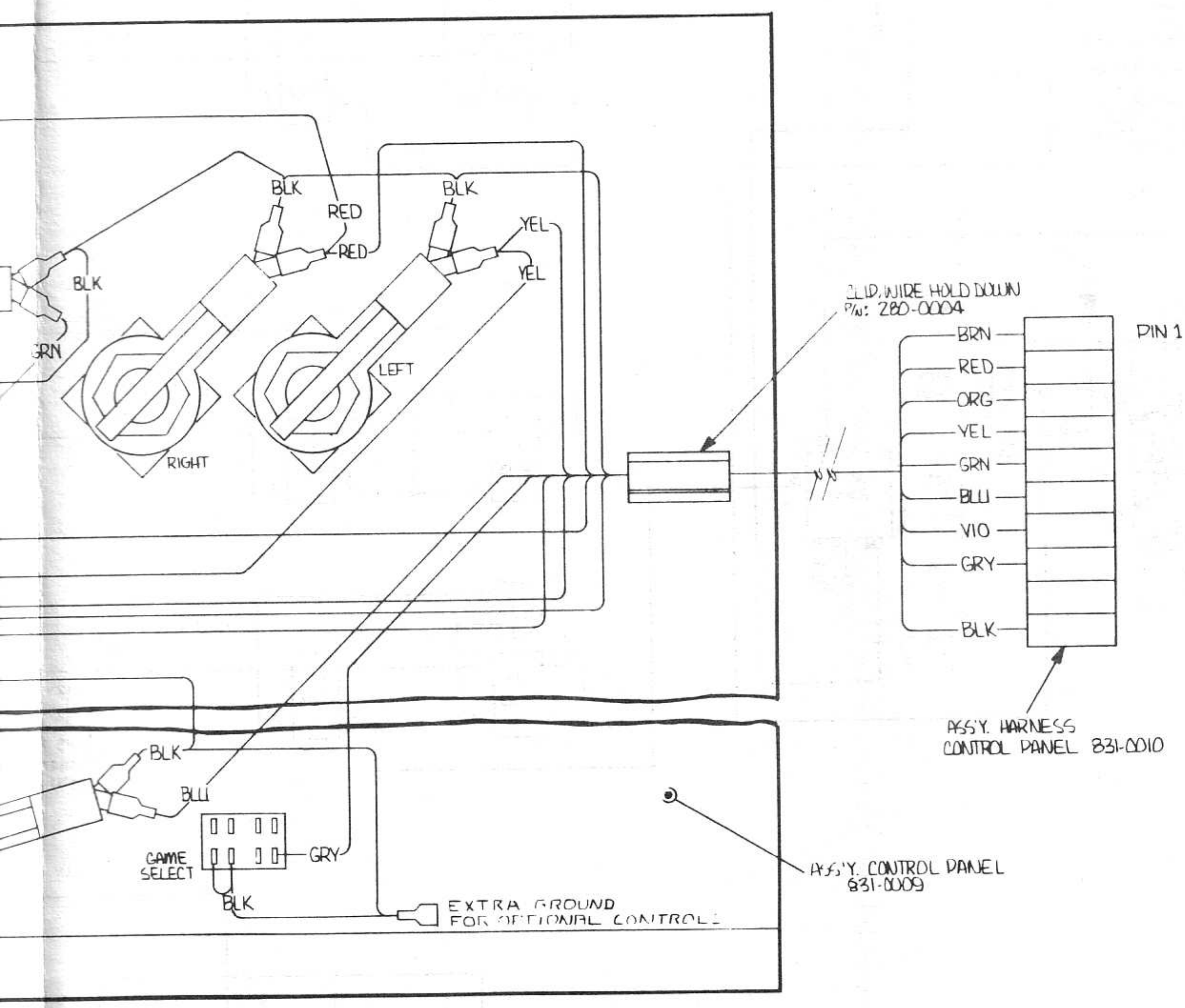
SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D		822-0002	C

SCALE NONE
SHEET 6 OF 6


8
7
6
5
D
C
B
A
RED
BLK
BLK
ORG
DOWN
RIGHT
FIRE
LEFT
UP
BRN
BLK
BLK
ACCELERATE
BLK
GRN
YEL
JOYSTICK
VIO
BLK
2 PLAYER
1 PLAYER
TO VOLUME CONTROL
SOUND IN-HEAD ON 2
SOUND IN - INVINCO
SELECT HEAD ON 2
OPTIONAL GAME SELECT SWITC

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED KH	12 28 79	

REVISIONS



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL —NOTED—

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS		DATE
DRAWN	Ken Hauter	12 28 79
CHECKED		12/28/79

Gremlin Industries, Inc.
San Diego, California 92123

ASS'Y. CONTROL PANEL COMPLETE HEAD ON 2 / INVINCO

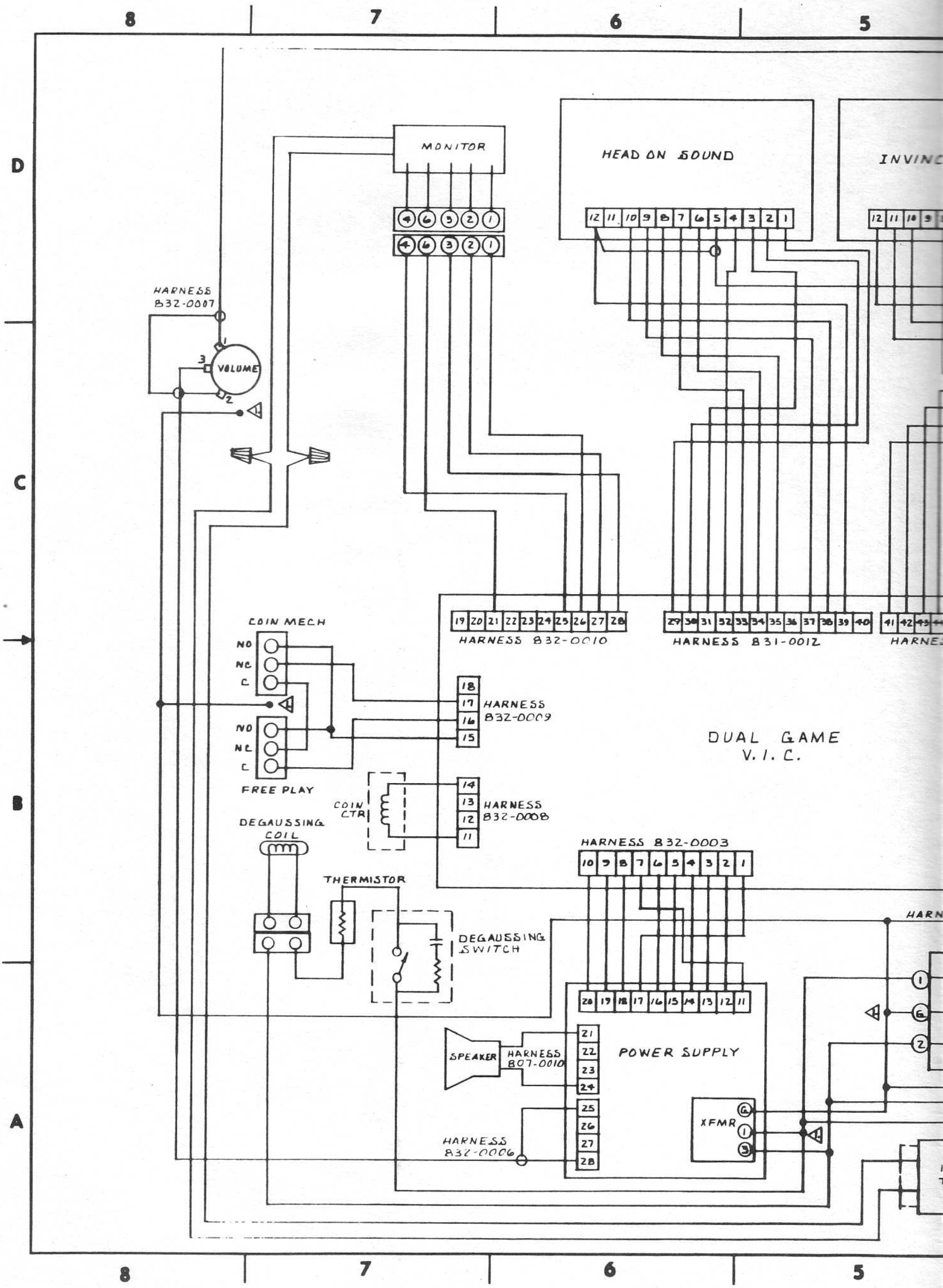
SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D		831-0008	A

SCALE FULL — SHEET 1 OF 1

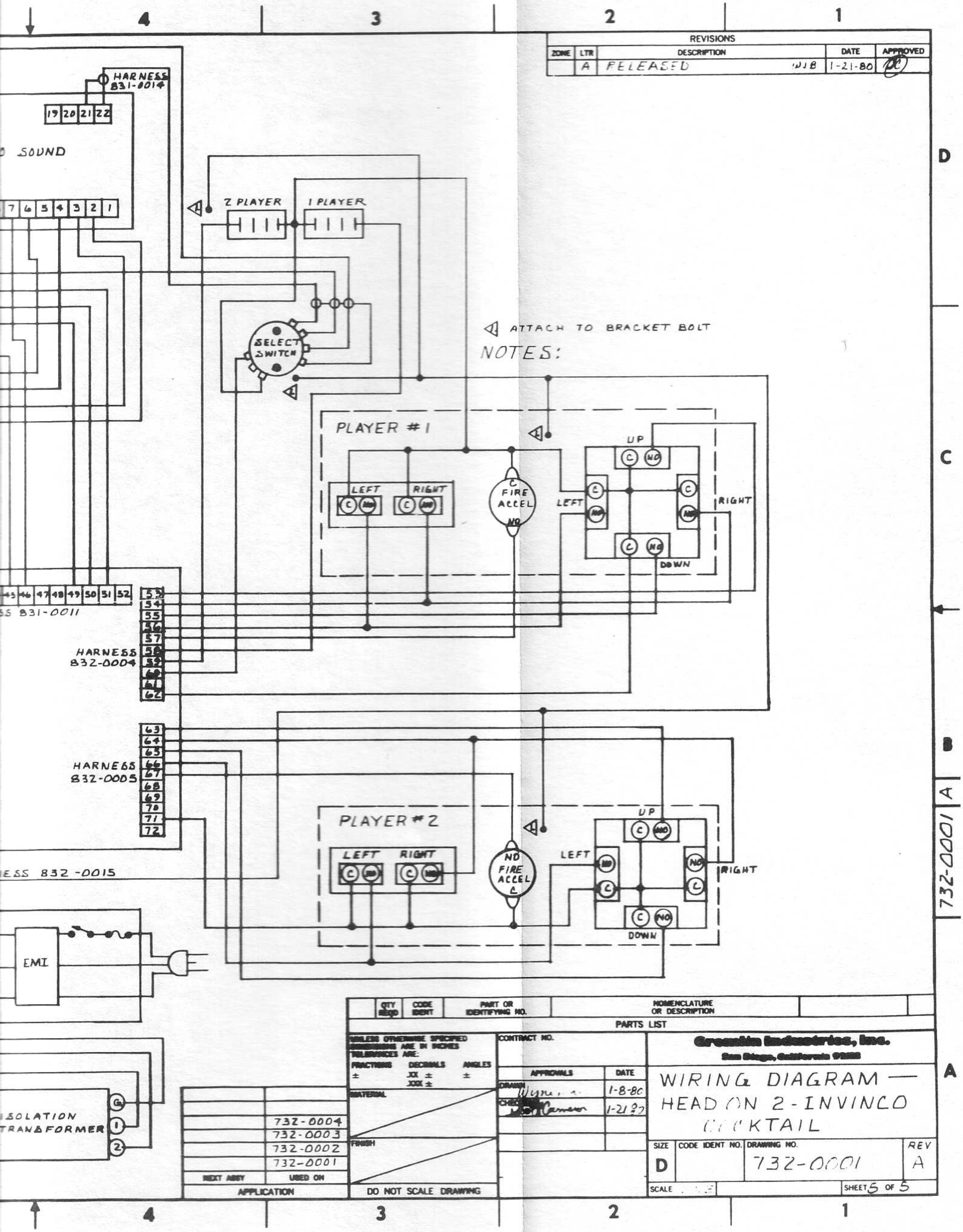
NEXT ASSY	USED ON

APPLICATION

831-0008 A



8
7
6
5
D
C
B
A
MONITOR
HEAD ON SOUND
INVINC
HARNESS 832-0007
VOLUME
HARNESS 832-0010
HARNESS 831-0012
HARNES
COIN MECH
NO
NC
C
HARNESS 832-0009
FREE PLAY
DUAL GAME V.I.C.
COIN CTR
HARNESS 832-0008
DEGAUSSING COIL
HARNESS 832-0003
THERMISTOR
DEGAUSSING SWITCH
HARN
SPEAKER
HARNESS 807-0010
POWER SUPPLY
XFMR
HARNESS 832-0006



REVISIONS
ZONE | LTR | DESCRIPTION | DATE | APPROVED
A | RELEASED WJB | 1-21-80
HARNESS 831-0014
19 20 21 22
SOUND
7 6 5 4 3 2 1
2 PLAYER
1 PLAYER
SELECT SWITCH
ATTACH TO BRACKET BOLT
NOTES:
PLAYER #1
LEFT
RIGHT
C FIRE ACCEL NO
UP
LEFT
RIGHT
DOWN
46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62
HARNESS 831-0011
HARNESS 832-0004
63 64 65 66 67 68 69 70 71 72
HARNESS 832-0005
PLAYER #2
NO FIRE ACCEL C
HARNESS 832-0015
EMI
ISOLATION TRANSFORMER
G
1
2
732-0004
732-0003
732-0002
732-0001
NEXT ASSY
USED ON
APPLICATION
QTY REQD
CODE IDENT
PART OR IDENTIFYING NO.
NOMENCLATURE OR DESCRIPTION
PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ±
DECIMALS XX ± XXX ±
ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING
CONTRACT NO.
APPROVALS
DATE
DRAWN 1-8-80
CHECKED 1-21-80
Gremlin Industries, Inc.
San Diego, California 92128
WIRING DIAGRAM — HEAD ON 2-INVINCO COCKTAIL
SIZE D
CODE IDENT NO.
DRAWING NO. 732-0001
REV A
SCALE
SHEET 5 OF 5
732-0001 A